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ABSTRACT

To promote and accelerate the creation of remedial training programs in technical institutes and community colleges, 46 participants from a wide geographic representation and from varied positions were selected to attend a 5-day training institute. Presentations by consultants and group discussions were utilized to meet the objects of developing a total plan and portions of the plan pertaining to guidance services, design and implementation of student development programs, and curriculum content and instructional materials. Some conclusions were: (1) A diversity of opinion exists as to what type of student should be accepted into a pretechnical or student development program, (2) The need for more definitions and directions of remedial type programs at the postsecondary level is acute, (3) Confusion exists concerning scheduling, (4) There is a need for soundly constructed and tested curriculum designs, and (5) There is no sirgle source of information on how to establish a successful program. Institute presentations, a list of participants and schedule of events are appended. (SB)

FINAL REPORT

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PRE-TECHNICAL POST-SECONDARY REMEDIAL PROGRAMS TRAINING INSTITUTE

Dr. Jack E. Tompkins
James Connally Campus

Texas State Technical Institute
Waco, Texas

Submitted
APRIL, 1970

U. S. DEPARTMENT OF
Health, Education, and Welfare

Office of Education
Bureau of Research

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PRETECHNICAL POST SECONDARY REMEDIAL PROGRAMS

TRAINING INSTITUTE

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James Connally Campus
TEXAS STATE TECHNICAL INSTITUTE
Waco, Texas

April, 1970

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U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education

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SUMMARY

The Pretechnical Post Secondary Remedial Program Training Institute was designed and presented for coordinators, supervisors, and administrative personnel in vocational-technical education for the express purpose of promoting and accelerating the creation of such programs in technical institutes and community colleges across the nation.

The significance of acquainting technical institute and community college administrators with pretechnical post secondary remedial programs is that the entire concept of preparatory offerings represents a shift in technical education philosophy. Such programs will present an opportunity to implement more flexible inputs of students into technical institutes and community colleges. In place of enforcing rigid entry requirements, the technical education institution will be able to accept students of varied achievement levels who will begin their post secondary education at the level most appropriate to their individual needs.

The Institute selected participants from a wide geographic representation and from varied positions. Objectives were to provide consultation by expert resource persons, to present examples of innovative and/or exemplary programs; to identify resource material; to provide on-site observation of such programs; and to encourage all participants to design and implement pretechnical programs which are an integral part of each student's occupational objectives.

Institute participants represented educational institutions interested in such programs; institutions launching such programs; and institutions wishing to improve and update existing programs.

Much group interaction was utilized and was considered most effective. Due to the size of the grant, it was impossible to conduct follow-up studies to determine the precise utilization of acquired knowledge by the participants. This would have been the most desirable outcome and would provide the basis for an informative study in this critical area of post secondary education.

CHAPTER I

Introduction

Well-designed and properly administered remedial programs for post high school students who need academic improvement in mathematics, reading, and the sciences are essential if technical education institutions are to fulfill their role.

Despite the increasing demand for training technicians, a disproportionate number of high school graduates are dropping out of higher education and are failing in the two-year technical education programs. Vast numbers of high school graduates never enter post secondary institutions because of inadequate achievement levels in high school, particularly in mathematics and the sciences. Also, older persons entering technical education programs many times exhibit a definite need for preparatory courses.

Although most post secondary teachers and administrators are aware of the need for such remedial programs, no specific curriculum has been developed, and guidelines for such curriculum development are scarce. Therefore, technical educators are faced with totally designing and implementing new curricular offerings, as well as securing resource materials and properly trained personnel.

Thus, a one-week intensive workshop was arranged for selected administrators of two-year post high school institutions. Specific objectives were as follows:

1. To provide an opportunity for participants to acquire an understanding of the characteristics and advantages of full-time, individualized post high school remedial programs.

2. To provide observation of pretechnical training programs in progress on the James Connally Campus of Texas State Technical Institute.

3. To provide consultation by expert resource persons concerning such specific problems as student recruitment, selection, motivation, and correction of deficiencies; teacher selection; optimum class and program size.

4. To present examples of innovative and/or exemplary programs on pretechnical education.

5. To identify existing resource material for such programs.

6. To encourage Institute participants to design and implement pretechnical programs which are an integral part of each student's occupational objectives.

7. To demonstrate that successful pretechnical education programs will attract more students in post secondary technical education and insure placement of highly skilled technicians in well-paying positions in industry.

The Institute was centered around utilization of consultants who spoke from their experience with pretechnical post secondary remedial programs.

Each consultant was responsible for an entire day's session. A formal lecture was presented during the morning session by the day's consultant who presented a comprehensive discussion of the assigned topic and illustrated the salient features of his lecture by examples drawn from experiences.

A local resource person engaged in the pretechnical program at the James Connally Campus of Texas State Technical Institute responded to the formal lecture and reinforced theories from actual experience.

The consultant and resource person then joined together to lead a group discussion of all participants. Later, small group discussions continued along the same lines with Texas State Technical Institute faculty members and the consultants working within the small groups to further explore the assigned topic. Each group then presented their specific findings and recommendations.

The Institute was conducted July 14-18 on the James Connally Campus of Texas State Technical Institute in Waco, Texas. A total of 56 participants attended the one-week institute, with 46 of the total receiving stipends and travel allowance as detailed in the terms of the grant. The other participants represented faculty members of Texas State Technical Institute.

Major accomplishments of the Institute were as follows:

1. Participants gained a more comprehensive knowledge of the scope of successful remedial programs and a greater understanding of the degree of planning necessary to successfully implement such programs.

2. All participants were provided a comprehensive overview of all resource materials applicable to these specific programs.

3. Consultants pinpointed specific areas of concern and provided specific detailed information within these areas.

4. Participants, who represented all geographic areas of the nation, were given the opportunity to share knowledge and experiences with each other. This accomplishment was cited as the most valuable by the majority of participants at the close of the Institute.

CHAPTER II

Methods and Procedures

The goal for selection of participants was to select those persons in a position to plan and implement pretechnical post secondary programs within the institution represented.

In order to achieve this goal, a series of procedures were followed. First, the chief vocational-technical administrative officer within each of the 50 states was queried for names of administrators, supervisors, directors, and deans of two-year post secondary institutions who would have an interest in attending a training institute.

Some carefully compiled lists were received where it was obvious that much thought had been devoted to screening and selecting likely applicants. By the same token, some lists were received that were nothing more than rosters of every vocational-technical educator within the state, secondary and post secondary.

Various judgment factors were employed in screening the lists of suggested invitees. For example, it was decided not to invite two people from the same institution nor to invite any secondary level educators.

A letter was drafted in which the purpose of the Institute was explained, costs outlined, stipend and travel reimbursement detailed, and other necessary information conveyed. This letter, along with an information brochure and an application form, was mailed to approximately 450 vocational-technical educators. (Sample letters, brochures, and applications are included in Appendix.)

Approximately 250 applications were received. As funding was available for only 50 participants, the screening and acceptance process was difficult. The following criteria were applied to each applicant:

1. Geographical area representation
2. Candidate's apparent ability to be influential in creating and implementing pretechnical programs.
3. Present position and future areas of responsibility
4. Geographic area's need for pretechnical programs

Fifty candidates and five alternates were selected and notified. The usual last minute flurry of cancellations and inability of some alternates to attend due to last minute notification resulted in 46 participants actually attending the Institute.

Each selected participant was notified immediately of his selection and also advised of the opportunity to earn three hours graduate credit through Texas A & M University in conjunction with the Institute. Participants who chose to earn graduate credit hours paid their own tuition and book costs. In order to secure graduate credit hours, students were required to submit copies of their transcripts and apply for admission into the Graduate School of Texas A & M University. To complete course requirements, students submitted a written report of the manual, "A Pre-Technical Program for Georgia's Area Vocational-Technical Schools". These reports were submitted upon registration at the Institute. Students also submitted to the A & M professor a written evaluation of the Institute.

Special consultants for each day's sessions were selected in cooperation with officials of the U. S. Office of Education and other knowledgeable vocational-technical educators. Consultants utilized and their assigned topics of discussion were as follows:

Dr. Walter J. Brooking
U. S. Office of Education
Washington, D. C.
"An Overview of Student Development Programs"

Professor George S. Whitney
Chairman, Engineering Technologies
State University of New York
Alfred, New York
"The Need for Technicians and Utilization of Pretechnical Programs as A Recruitment Device"

Dr. Arthur Pollock
Chairman, Directed Studies
St. Petersburg Junior College
St. Petersburg, Florida
"Experience with Directed Studies in Reading, Mathematics and Communications"

Mr. Vernon Burgener
Coordinator of Research
State of Illinois Research Coordinating Unit
Board of Vocational Education and Rehabilitation
Springfield, Illinois
"Designing and Implementing Pretechnical Programs"

Dr. Clodus R. Smith
Director of Summer School
University of Maryland
College Park, Maryland

Faculty members who served as presiding officers and discussions leaders were as follows:

Dr. Jack E. Tompkins
Associate Dean for Research and Development

Mr. Bill Ross, Head
Mathematics Department

Mr. Arthur Young
Counselor

Mr. John McClinton
Pretechnical Program Instructor

Mr. Bob Gentry, Head
Technical Communications Department

Each day's session began with a formal presentation by the consultant who was allotted one and a half hours. Following this, the assigned faculty member and the consultant worked jointly to direct group discussions and response sessions.

Following the lunch break, participants reassembled into workshop groups. These small groups were designed to provide the participants with the opportunity to develop cooperatively a written plan detailing the concepts, contents, benefits, and procedures for a proposed student development (remedial) program. A portion of the complete plan was developed and written during each session.

These written plans were submitted to the faculty discussion leaders and consultants for collective utilization prior to the end of the day's work at 5 p.m.

Daily objectives for each workshop group were as follows:

Monday:	Develop, by group discussion, and write collectively, an outline to serve as the guide for achieving the "overall objective".
	Develop, by group discussion, and write an introduction for the total plan. The introduction should include such topics as need, benefits, and implication of such student development programs.
Tuesday:	No workshop (workshop groups toured campus facilities and visited the ongoing pretechnical programs).
Wednesday:	Develop, by group discussion, and write collectively, that portion of the total plan pertaining to testing, counseling, and guidance services.
Thursday:	Develop, by group discussion, and write collectively, that portion of the total plan pertaining to designing and implementing student development programs.
Friday:	Develop, by group discussion, and write collectively, that portion of the total plan pertaining to curriculum content and instructional materials.

By utilizing these group work sessions, each participant was able to carry away with him at least a beginning outline for a viable, workable pretechnical program to be implemented by the institution which he represented. Much emphasis was placed on this activity so that perceptions of participants could be recorded on an immediate basis rather than months later. All participants were active and aggressive in the workshop groups and each expressed approval of this device as a reinforcement measure.

Faculty members of Texas State Technical Institute who attended the Institute served as workshop group leaders, assuming the role of discussion stimulator and recorder of material. Serving in this capacity were Howard Nelson, Zack Belcher, Don Loftin, Jim Lilly, Bill Rueter and Ken Willis.

Although all presentations by consultants agreed in essence on the need for student development programs, there was a diversity of opinion concerning the actual levels of such programs, which is reflected in copies of all lecture presentations appended to this report.

Chapter III

Summary and Results

Among the most meaningful conclusion to be drawn from this Institute were the following:

1. A diversity of opinion exists as to what type of student should be accepted even into a pretechnical or student development program. Some Institute consultants felt that any student, regardless of learning rate or accomplishment, should be accepted while others disagreed. One consultant even suggested that only those students in the top twenty percentile of test scores be admitted.

2. The need for more definition and direction of remedial type programs at the post secondary level is acute and steps should be taken to channel research funds into this area as quickly as possible.

3. Confusion exists even concerning scheduling. For example, is it possible to establish a definite time period for students to complete a remedial program or should remedial programs allow entry and exit purely on achievement?

4. The need for soundly constructed and tested curriculum designs for remedial programs is readily apparent.

5. Although most educators involved in post secondary vocational technical programs recognize the need for pretechnical training, they can find no one single source of information on the "how to's" of establishing a successful program.

The recommendation receiving the highest priority by participants at the Institute dealt with the need for more research into this particular segment of post secondary education.

The educators also felt that funds were required to develop and test instructional materials designed specifically for pretechnical programs rather than the prevailing practice of adapting materials developed for other programs.

Despite the success of the Institute and the enthusiasm of all participants, it is felt that more meaningful data could have been obtained had funds been available to conduct a

follow-up on all participants to probe their utilization of acquired knowledge. Have they been instrumental in implementing a pretechnical program for their school? Have these participants helped restructure existing programs to make them more relevant to actual student needs? Are participants utilizing information and data made available to them? The answers to such questions would be of great interest in measuring the total effectiveness of this or any short term institute.

Chapter IV

Evaluation

Participants were requested, on the concluding day of the Institute, to evaluate proceedings from the viewpoint of actual learning experiences and also the adequacy of local arrangements.

Samples of each measurement device are incorporated in this report.

The honesty of Institute participants, although highly desirable, makes it impossible to publish complete results of their evaluation of consultants. To speak in broader terms and not be offensive to highly capable educators, let it suffice to say that participants were acutely aware of those consultants who had spent considerable time and effort in preparing their presentations and were frankly and outspokenly critical of those consultants who belabored philosophical minutiae and were unable to discuss the substance of remedial programs.

Tabulations of Daily Evaluations

Did you feel the overall presentation offered relevant information

3	13	39	99	67
1	2	3	4	5
none				

To what extent will you be able to utilize information you gained today

24	39	78	10	35
1	2	3	4	5
none				

To what extend did you gain a clearer understanding of pre-technical education from the speaker?

19	44	86	82	38
1	2	3	4	5
none				

To what extent was the information presented today new facts with which you are not familiar?

22	37	84	70	32
1	2	3	4	5
none				

How important was today's consultant's specific knowledge to pretechnical programs?

7	14	37	81	57
1	2	3	4	5
none				

Had more funds been available, it would have been of interest to devise and administer test instruments prior to participation in the Institute and following the close of the Institute to measure awareness of and identification with the need and scope of pretechnical programs. However, scarcity of funds made this more sophisticated evaluative process impossible.

Participants gave generally high ratings to all local arrangements. Some scattered complaints concerning bad airline connections, confusion on housing assignments, and the July heat in Texas were offered, more in the spirit of comradeship than criticism.

Tabulations of Evaluations of Local Arrangements

Please rate the following:

Advance information about registration, housing, etc.?

0	2	2	11	26
1	2	3	4	5
none				

Registration procedure organization?

0	1	2	11	30
1	2	3	4	5
none				

Housing assignment acceptable and comfortable?

0	1	4	9	24
1	2	3	4	5
none				

Scheduled entertainment?

0	0	4	17	22
1	2	3	4	5
none				

Advance information accurately and clearly describe the actual program presented at the Institute?

0	4	5	19	15
1	2	3	4	5
none				

Planning of daily schedules for the Institute?

0	1	5	16	19
1	2	3	4	5
none				

Also of use in evaluating the Institute were the individual papers submitted by students who were seeking graduate credit hours through Texas A & M University. Dr. Earl Jones' summary of the papers is included in this report.

PRE TECHNICAL POST-SECONDARY REMEDIAL PROGRAMS INSTITUTE

James Connally Technical Institute

Summary of Participants' Evaluations

Earl Jones
Associate Dean
College of Education
Texas A&M University
College Station, Texas 77843

Overall View

The participants were unanimous in their praise for the general institute. Each listed several valuable ideas or techniques garnered from the material and several expressed determination to implement remedial courses in their own programs. No one rated the institute lower than "very good" and many rated it "excellent". Since these were university deans, program directors, state supervisors, and teachers, their opinions should reflect experience and judgment.

Physical Facilities:

These were rated from "very good"to "excellent". Most felt the arrangements contributed significantly to the results.

Organization:

Unusually warm praise was proffered to the James Connally Technical Institute staff for the organization and for the attention paid the participants during their stay. Mrs. Mary Belcher was named repeatedly as making the affair "smooth and efficient".

Methodology:

The arrangement of morning presentations, always with a chance for questions, and afternoon discussion sessions was rated very high. The leaders of the latter were complimented, especially Mr. W. G. Rueter who was referred to as a "master discussion leader". Several noted that one day, the first, was dominated by the speaker. They felt that this reduced the effectiveness of that section of the program. Quite a number also noted that Friday afternoon deteriorated and suggest that the campus remedial facility visits might better fill that spot in the future.

Section Evaluation

Brookings:

This speaker was rated tops on general introduction to the conference and in presenting the theoretical framework. Some participants felt he lacked practical solutions to the theoretical problems posed. Others noted that he talked through most of the discussion period, and valuable insights thus were lost.

Pollack:

Mr. Pollack's ratings were very good and the observations primarily centered on his first hand knowledge of remedial programs and his explanations of their results. Many emphasized his encouragement of group participation and his sincere efforts to try to be of help.

Smith:

This speaker was rated "fair", with some comment on his "uneasiness" as a detracting feature. Nevertheless, the members liked the way he related his material to that of the previous speakers. They also appreciated his handouts.

Burgener:

The participants were sharply divided on this speaker; about half felt he had done a good job of entertaining and imparting knowledge, while the other half labeled him as "sometimes irrelevant". The most frequently occurring comment was that he was far too argumentive, thus shutting off much valuable discussion.

Whitney

Although his formal presentation was not rated as high as some others, most noted that he was excellent in the discussion period. Some of his material was questioned.

General Conclusions and Suggestions

The participants were overwhelmingly in favor of the program and urged "that this be the first of a series" to really come to grips with the problem. Several noted that it was the first or best exposure they had had to remedial programs and they would like to pursue the topic further. Suggested topics for other institutes were: research on test instruments, investigations of program results, how socio and psychological factors affect learning technical materials and how to solve or alleviate their effects.

Texas A & M University would like to congratulate the participants on their candid reviews of the material covered and the speakers. Most of the evaluations looked into minute details and related their own program experiences to the material. Had complete anonymity not been guaranteed, publication of several would have been worthwhile as a guide for remedial programs in general and to future institutes on the subject.

APPENDIX A

AN OVERVIEW OF STUDENT DEVELOPMENT PROGRAMS

Dr. Walter Brookings
U. S. Office of Education
Washington, D. C.

Welcome. As I start to talk with you quite informally, I'd like to ask that if I stray from this speaking device and you find you cannot hear me, raise a hand and give me a "hi" sign, because if you cannot hear you might as well not be here.

I'd like to get a little acquainted with you and with what you represent, so that I might have a better sense of who I am talking to.

How many of you are from institutions which are teaching technicians? That's wonderful.

How many of you have come from state or local education organizations? Good.

How many of you are guidance people? Interesting.

How many of you are heads of a technology program of some kind or a group of such? Right.

I think you are exactly the audience that we ought to be talking to. I think you are knowledgeable about a number of the concerns that we will address here, and it makes it easier for us to get into the kind of consideration I think is most germane to what we have to deal with here. I don't think that it is out of order to start by emphasizing the evident need in our nation for a very much larger number of (graduates qualified, non-baccalaureate, occupational specialists of whom technicians are some from post high school programs, approximately two years, generally) this can vary.

The emphasis of the times in which we live requires that we have a more highly-educated group of people to do the things that have to be done.

These two-year post high school persons, can include skilled, special-educated secretarial help, male or female, or accounting specialists, or data processing people or distributive people, or those in the health field - nurses, laboratory technicians and so on - a whole flock of them.

In the agricultural field, one of the areas in which I think we have missed the boat most seriously, when you stop to think that half of our farming population, the ownership or the producers of food and fiber in this nation, will nominally or actually be retired in the next ten years. That means over a hundred thousand people a year, because as you may know, the average age of the ownership of our farms and producers of food and fiber is somewhere in the neighborhood of 57 or 58 years. The cost of putting a man in a chemical plant or steel mill, or even perhaps a skilled

worker in some places when the farmer is both part owner and worker. The education that he needs must be far beyond that of just an ordinary high school education if he is to cope with the problems that he has to solve.

So the agricultural area is one in which this post high school kind of program needs to be increased, and I might tell you quickly, you who come from the education field and some from vocational education, I am not an ag or vo-ag man person. I am simply stating the facts of life.

Then you get into the physical science and related engineering fields which is what most often is called technical education, but which I think is only a part of this whole spectrum that we are talking about.

Now all the way across the board, these persons are supportive kinds of persons. They must accept responsibilities; they must be well educated; they must understand the professional, or the manager, or the owner with whom they work. They must understand his language, something of his concepts, something of his problems, something of his job, and in a very real sense, be the in-between man or woman. So they are responsible people.

They must be; and the reason that they are becoming so much more important, as the years go by and the crescendo of need rises to an ever-increasing pitch, is the technological complication of our world of work today.

Now we hear this regularly, all of us are busy about this kind of education, but the seriousness of it sometimes escapes us. We sometimes find ourselves wondering if it is really true. Yet, if we stop and look at the world of work today we find that it is almost safe to say that most of the market for just plain sweat is no longer there.

You can see it on our farms; you can see it in our cities; you can see it even in the service industries to some degree. So, in order to get the work that has to be done completed, we have to have a greatly increased number of these people.

Now this leads, with that backdrop, to the question then: why are we here today to talk about student development or pretechnical programs?

I'd like to stop for a moment and emphasize the semantics that I think will serve us best in this kind of a program. Experience tells us that the use of a term like student development has a description of your program has the most positive reception among those with whom you are talking. The reason, I think, is clear if we stop to look at what we are talking about.

Students development is a term, and another term that is used sometimes is opportunity program. Student development has no accusative angle to it. It is something that everyone can accept as something that is a positive sort of something. It doesn't imply that somebody is less than he should be, and the language that we used when we prepared this guide "pretechnical post high school", says exactly what it is, and some of us believe <u>that</u> is what a publication should do. In a sense, it doesn't do for us all that

we would like to have it do for us, because it has that pretechnical something-missing connotation in the language. So for purposes of reporting from the states, we have asked that we adopt as the program name, Student Development Pretechnical.

This is a step in communication, and we believe that if we use the right words today the chances are fairly good that they will be right tomorrow and the next day and the next day. If we tend to use words that trip us, they may not trip us this afternoon, but they will catch up some time, and we, therefore, emphasize this point.

Student development is familiar in those places around the country that have undertaken to promote programs of this kind. The words go across better. They communicate better; they are accepted better, and you can describe what you are talking about because people are listening, whereas you do not turn them off as you might with the other language.

If we need a very much larger number of these supportive kinds of people, why is it that it is such a project?

The heart of the question lies in a number of rather complex factors.

First, programs to educate people have to be set up in a fashion that is economically viable. The concept of one person teaching and one person listening is a nice idea, but it is too expensive. Certainly it is too expensive for a large scale educational operation. All of your experience leads you to know something about that. This means that you must have a program that is administrable in terms of some numbers; in other words, you must be able to find people with problems that are comparable, with somewhat uniform level of capability, understanding, communicative capacity, and so forth, so you can work with them as a group. You find a very serious problem of attrition if you do not have a fairly uniform group of people. You have to have a large enough group of people to pay the bills, or the justify the space, the teachers, and the teaching equipment that you need to teach these people.

So it becomes simply an administrative proposition when you begin to examine it in light of the experience we have around the nation in these post high school programs. One of the characteristics that we observed with rather terrific frequency is that many programs which aspire to good, high standards have terrible attrition rates - sometimes fifty to sixty per cent. Obviously something is wrong if that happens. It is not necessarily accusative of the individual, but there is something that is not right about the system.

If persons are good enough to begin in a program, they should somehow uniform enough, or you should be able to manage them in a group, and get them somehow to the level and the capacity to which your objective addresses itself without a large attrition.

Yet around our country here in our technical programs and in our equivalent supportive programs, the attrition rates are pretty bad.

What does the attrition rates do to you as an administrator? As a teacher? Or as even a student? For the student it's curtains in most cases. And this leaves a bad taste all the way around, because you have wasted somebody's time.

Philosophy that may have existed over a period of centuries in our higher education programs, that there needs to be a certain amount of attrition just to show that those who are left are qualifield, is no longer viable. It is not economically feasible in terms of the gross economics of our nation. You cannot afford to scrap people, because you still have to pay them some way. They have got to find some way of making a living and if you do not educate them, they won't work. They cannnot work. So the concept of failing them for the sake of demonstrating quality has no place in the occupational education business in our nation.

There may be other good reasons for persons dropping out and failing. That is part of what we are here to talk about today. You know the process of dropping out of a program does not necessarily happen when a person has left. If you have a group of people who are reasonably comparable in their understanding of the language and of the basic understandings and some of the skills they must bring to a program at the beginning, you can move that group along fairly well. But if you have some persons who are unable to communicate or unable to keep up with the ideas that are a part of the group action in the learning process, the dropping out of that individual who cannot keep up may happen the first or second day, or the first week. He may not actually leave until he has flunked out, but the actual act of dropping out literally happens, sometimes psychologically, early in the experience. And this is a matter that can happen in almost any kind of program and even happens to students that you would never expect to be subject to failure in a selective process of getting people together.

So we have said that we have to have some means by which we can bring a group of reasonably qualified people, start a program, and lead it to its completion within a reasonable time in order to have the economics right. If you start with a class that is large enough to be economically sound, and then lose half of your class, you have lost your economics down the drain. And I would suggest that as you think about that, think in terms of your own experience, and think in terms of the concerns that you and you administrative superiors have in this matter. This is really what this is about - our pretechnical, our student development program. It is to avoid attrition, and it is to fill classes with people who have a chance to succeed.

As we looked around the nation at these attrition rates, we saw the problem that seems to be universal is: Where do we get students? How do you get people who want to become these supportive persons? It appeared to us that in a few places there were some really good things going that could be a key to help to solve the problem of student recruitment, student retension, and economically viable programs.

The most likely answer seems to be student development programs. In looking at the education of occupational specialists across the nation, you can pick out two or three rather serious problems. The most serious problems concerns people. One problem is teachers, and the other is students.

How do you get qualified teachers and how do you get enough qualified students? Those are the two most serious problems. You may say to yourself that getting money to start programs, getting facilities, getting laboratory equipment, and that sort of thing is the big problem, and it is a problem. But your toughest problems in the last analysis are your teachers and students. Perhaps there ought to be more institutions which have two-year programs along with their four-year programs. Some of the Rocky Mountain states and other states with large areas and small populations have made rather good progress in getting the big two-year programs in these larger institutions where there is housing and so on. But, generally, across the country the four-year institutions have not really been a part of the two-year supportive kind of person education programs, but rather, it is the community colleges, the technical institutions, the area vocational schools and that group of institutions, private and public, which have assumed this role.

The one problem that an institution can approach is the student recruitment, the student development program. This is why we are here today. It is to talk about how you can do something for yourselves, for your institutions, for your ultimate clients, who are students and employers. And don't ever forget the employer. In many respects, in last analysis, he is more important than the student, though we might not ever say so. An institution can undertake and can develop a student development program. It will take some experience because it doesn't unwind and operate easily, just automatically. It is like any other new program. It will probably take three to five years to get one really started well and to get it manned and to get it to the point of doing for you what it ought to do. But it will provide, we are told by those who have these programs, that it improves your economics, it increases your number of students, it reduces the number of failures, and best of all, they say, some of the very best students on their campuses come by that route. Usually those students are a little more mature, perhaps a little older, and experience shows that these students bring something fairly special to the campus as they come through the student development program.

Why do we have to have this kind of concept? Let us examine an assumption that is made about recruiting students for these post high school specialized occupational objectives. I think that it is fairly safe to say that the first notion all of us tend to have is that we will fill these classes with the qualified people who have come from high schools. This is not an unreasonable notion. The fact that you can find some, indicates that the high schools can do it. However, the fact is that if you really stop and coldly examine the whole problem, the high schools do not produce sufficient numbers of persons who are qualified to start many of the programs to supply the employers' demand, or in order to take care of the needs of these people.

I think the first assumption needs to be made that high schools are not producing, at the moment, sufficient numbers of qualified persons required to enter into these programs with the reasonable chance of succeeding.

You might say, why is that? This may sound like a radical idea, but I believe that the more you like it the more it will be found to be true. Why is it that you cannot expect to find enough fully qualified persons to fill your programs? It is because our entire educational system, which has served us so very well in the past, has addressed itself toward the aspiration, almost the national ethic, of the baccalaureate degree.

Every year we skim off that percentage of our population which has demonstrated that it has best mastered the abstract skills of language, of science, of mathematics - the skills required to pass the kinds of examinations that are given to evaluate high school students. This is not wrong, but those who have come out with those skills largely go to the baccalaureate programs, and they should. At the present level of functioning of our high schools, this is not to say that some day our high schools will be able to produce sufficient numbers of people to take care of all our needs. We would say excellent; bone up the high schools, but let's get these student development programs going in the meantime.

Fact is that there is a very large population that comes from our high schools, a population of young people who have perhaps a different mode of learning. They have a different set of interests; they have had a different set of circumstances; perhaps they have had to work, or perhaps they have chosen to work at the expense of academic excellence - academic excellence in terms of getting these abstractions and being able to perform on these examinations. Perhaps they have had consuming interests which have caused them not to become very concerned about their math and their language and their science.

A first class example is the ham radio artist who stays awake all night operating his set and sleeps through all his classes in high school, second, thired and fourth year.

This happens, yet you can not say that those young people are not capable people. They do some interesting things. They get enough of the abstractions to read the instructions of how to do what they want to do. They get enough auditory learning skills so that when their friends tell them something they can record it in their minds, comprehend it, and use it. They get enough science, so that they can put some pretty sophisticated things together. They get some very interesting skills in their hands and in their minds that have to do with assembling and operating sophisticated hardware. But when they come to class in high school having spent their evenings and their nights with these entertaining and very educative operations, they are not there. And they wind up with grades which immediately bar them from being considered as a person qualified to enter your programs.

You are right in saying to them, "You are a great guy, but I don't think you've got it. You are in too fast company without the math and the science that you should have." So this is partly measuring the problem.

We have a population, a very large one, that has the ability. The Army intelligence tests have shown that there is a very large number of people, larger in number than those who go to college - who have the intellectual ability to excel, to master the problems, and to learn the things they have to learn. We know that, and we know that this is true. Because the work of the world is done oftentimes by people, who have started with random experience, with bright minds, with reasonably good motivation, and who have worked and accidentally learned over a period of years what they could have learned in two or three years if they had had organized programs.

This is where many of the "technicians" that you find in our present-day industry came from. But that is not good enough any more because if you ask these people, who are capable and who are functioning very well at the moment, about their mathematics and about their language and their science, most of them are short in their preparation. They do not have enough knowledge of these subjects, and when the new electronic-automated equipment, or the new data processing equipment comes out, these men find themselves unable to cope with it. This means that they did not get a broad enough base in the beginning.

The fact remains that in order to enter into a good program to become an associate-degree nurse, and engineering-related technician, to study agricultural technology, to be a good secretary, or to succeed in a good accounting or data processing program, you must have almost the equivalent reading capability and a varying amount of mathematical preparation of from at least one year in high school to two or more years, and in most cases, an organized exposure to physics or chemistry with laboratory experience.

If programs do not hold to those requisites and still aspire to educate people in those objectives, programs will fail or they will fail a large portion of their students. Unless the student has sufficient knowledge of the <u>why</u> of what he does and also the <u>how to do</u> things that he does that are peculiar to his specialty, he cannot cope with the changes that come down the road tomorrow and the next day.

You have this critical hump where you can get them over the hump or you can't get them over the hump. If you do not start with enough well-prepared persons, you have only two possible alternatives.

You will either lose your program by slowing down to the speed of the slower ones, producing graduates who are not competent - and we do that in a desolating quantity in this nation - or you will bring some through at the level and quality that you desire, but you will fail out enough so that your economics go to pot, and your student morale drops off, and your instructor morale goes to pot.

You come right back to this almost endless circle. High, solid prerequisites you must have to select people who can start where they should in order to finish within the scheduled period of time. If you have a viably planned program that is to finish at a certain time, you cannot get there unless you start with certain things to begin with. You cannot possibly pick them up after you have started, because all of these programs to educate these supportive kinds of persons are just as rigorous and just as demanding as any four-year baccalaureate program. They are different but just as demanding, and they are every bit as justifibly called collegiate level education as is a baccalaureate program. They are different, that's all.

So you connect all this to the fact that to start with you have got to have persons who are ready. If you cannot get them from high schools, what do you do? Obviously, you get them from high schools but in various conditions of readiness.

You find yourself confronted with the preparatory program which we want to call student development. The concept of the prep school in this nation is not new. We from the Office of Education, as we talk of these programs, are not talking something from our little round heads developed in a cubicle some place in a bureaucracy. We are reporting what has been found by people who are, in fact, in business, and we, therefore, report it with confidence.

We provide a story in this guide which is not the plan necessarily, but it is a plan which starts out with a rationale which describes what it is talking about. Then it describes a prep school program which has proved to be successful at a number of places. It is presented in the same fashion that you present a set of blueprints and specifications to a builder. If you want a builder to build something for you in Colorado or Maine or Florida, or Arizona, you don't go and talk to the builder; you don't hand him a book; you don't call a conference. You give him the blueprints and the specifications, and you say, "Here is the building. Tell us what it will cost in Maine, or Florida, or Colorado, or Arizona." Obviously, it will look different in each place because there will be different climatic conditions, different architectural considerations to fit the landscape, and different materials. But he has something that he can come back with, and if you say, "Okay. Build it", he can go and build it.

It is the same when we provide the concept of these programs, these are plans to be modified to fit your needs. They are not necessarily infallible or invoilable. We provide the story of what it is all about. We give some example of how programs can be lined up, and then we give some course outlines. The course outlines are the poorest part, frankly. We admit this, but they are a beginning from which people can take them and start. They are enough of a beginning so that you can find persons who can pick them up and can put them to work. This is the basic understanding or concept you have in approaching this. The prep school concept has been a respected one in this nation. People sometimes have, in a sense, snickered in earlier days about the rich man's son who may be played through high school, or however, you want to describe it. He did not prepare himself

adequately to get into a college, and in his family's tradition nothing would do but that he get into a college. There has never been any objection to his being sent to a prep school. It was perfectly respectable and respected for those who could afford it. And it works.

Our military services, as many of you must know, have their own private prep schools or have supported prep programs for the academies of each of the main services. There is no quarrel with that. It works. There is nothing wrong with it, socially or in any other way.

There have been some experiments in recent years (again back to our penchant for the academic kind of education which I repeat has served us very well, but in the last 25 years has fallen short because it fails to provide enough educated people of the kind of supportive persons we are talking about.)

These prep schools have been extended - in a sense, in the concept of Upward Bound. Upward Bound has been a very interesting experiment, and a very important one and I think, largely successful one. But in last analysis, I am afraid that you would have to say that it has been a producer of brownie points for those who have worked with them, scoial brownie points may be. Generally, they have taken persons who have the capability and have put them into a situation where it really was a prep school situation. They have done a rather good job of getting the students to a place where they have demonstrated that they can go on into a baccalaureate program and succeed. And we are "gung-ho" for it. We are one hundred per cent for it. The only problem is that it has <u>not</u> been directed toward enough people.

We know how to do it, we simply are not doing enough of it and largely, it has been directed toward the baccalaureate-bound persons, and we don't quarrel with that. All we say is that the prep school concept is a concept that is perfectly viable. It has been demonstrated time and again to be fundamentally functional and suitable and economically viable, too.

What we are saying to you today is that we are gathered here this week to consider means by which we can promote and provide preparatory opportunity student development programs for persons to become involved in these supportive operations. These objectives are not in terms of a few hundred people in this nation, but a few hundred thousand people. This will come about by each one of you starting one where you come from - a few more in few more places.

The pattern that we talk about is a pattern that has been demonstrated to be viable. This guide essentially documents the program that operated at the agricultural and technical college in Alfred, New York. They started a long time ago by a series of shifts, and they waxed and they waned, but they waxed better than they waned, and they survived. Finally, in fairly recent years, they were set aside and considered to be the schools for some rather special kinds of programs.

When our men returned from overseas after World War II with GI rights to education, many of them had a burning desire to get a better education. They had seen technoloy in action, and understood what it was. They came back and in Alfred, New York, the program was started to train these men from where they had left off in their high school preparation - in terms of language, or mathematics, or science. In some cases it was all three, and in some cases only one or two of the three. Some of the students had a good start, and others had to work very hard to be able to catch up in a year. All were mature, all were motivated, and so they started this kind of program. They patterned it after a program that was operating at Franklin Institute, a private institution in Boston started by Benjamin Franklin and funded by him. At Alfred over the years, this concept has been developed and prefected. They have consistently brought in ten per cent of their student body - a hundred to a hundred and ten or twenty people each year since about 1950 - turning down persons who appear completely qualified, and taking these others in their stead. This is done in order to provide this peculiar and special service to students who need to fill in from where they left off in high school (some of them are high school graduates, incidentally) to where they are actually ready and have a chance to succeed in these excellent programs. The schools science, scientific technology, and agricultural technologies are among the best in the nation.

This essentially is the backdrop of the experience that we refer to. For four years Alfred had a summer program only. They dropped out of the two semester concept because they did not have sufficient dormitory space. They did not feel that they could spend their dormitory space for three academic years for a student, and they lost something that was missed. They understood something of what they lost when they dropped back to only a summer program. Granted that they could select well-qualified people which served their purposes, but they lost something because they did not have the downward mobility that an academic year program has.

When I talk about downward mobility, I talk about the student who was selected and, by all criteria, appeared to be mature and appeared to have all the math, science, language, and everything else he needed to be a successful student. Maybe in the second week or so, somehow he began to flounder, stumble. They sensed that and thus the pretech program. Bog down the mobility, if you wish, but rather than to risk his failing this gives the student a means by which he can shore up his weaknesses and move ahead. It may cost him a semester, but sometimes it doesn't. George Whitney tomorrow can tell you more about that.

It is extremely important to salvage people that had given no previous indication of failing.

When we began talking about this back in 1966, we studied it and began working on the guides as early as 1964 and came to the conclusion that this was a workable approach to one of the most serious problems - that of recruiting qualified students, or of getting qualified students in and through programs.

We really had our materials, as some you perhaps know, in fairly good shape by the time we held our annual national technical education meeting. We held it at Cocoa Beach, Cape Canaveral that year. We distributed a mimeo copy of this first part of it. Interestingly enough, the state of Connecticut took a careful look at it and laid aside a quarter of a million dollars right away and started four pretechnical, student development programs, one in each of their four state technical institutions. It wasn't necessary easy. They had the money, and they told us afterwards that the amount of money that they laid aside was about what they needed. We were pleased because this was about what we had suggested. They had their ups and downs, but they have since had a chance to see how it works. They have graduated students who have come through it. They have observed their smaller number of failures. They have seen the advantages of it. They have reached in their communities certain groups of people that would not have otherwise been able to be reached and brought into the program - people who badly needed to be represented, some who are socially and economically disadvantaged ethnically.

This is an extremely important thing because people with aspirations and abilities must be brought into the picture. This is the way of opening the door and saying, "We have a way of giving you a chance. Come along with us." Last year, when the state of Connecticut was having money shortages as some states tend to from time to time and the State Department of Education could not pull up the quarter of a million dollars - a line item in the state budget was approved just like that for the amount of money necessary to continue these programs. Incidentally they have added another technical institute. So the state of Connecticut has proved to itself and to its politicians' satisfaction and to its employers' satisfaction that this is a good investment - that it works.

Fayetteville, North Carolina, is an interesting little example, and there are several others. But Fayetteville started in 1966, and they have, I think, perhaps as many as 125 to 150 people in their program. Some of them hike off into a four-year program, and they ought to. They should be encouraged to if this is what they want to do and they have the capability because we never should stop feeding that important segment of our educational structure. Some will find that they really aren't as interested in becoming prepared as they thought. It may be that you will find a hot rod specialist that comes to the conclusion that, by golly, he'd rather be the best auto mechanic supervisor of service in the big Ford or General Motors dealership and goes in that direction into a different kind of program. And he should because we certainly need those people too.

But out of that hundred and twenty-five or so, there may be as many as 100 or 90 that can be divided up in about four, five or six different technologies. The interesting thing is that many of the young people who come to these student development programs will come because they say, "Golly, I want to be in electronics or data processing or something." Notice that it is those programs which have the glamour that they have heard about. But when they begin to find out that there is a special

advantage to being an instrumentation specialist or a real opportunity as a water pollution specialist or something else or something else. They find that it happens with their nursing programs, or in some of their health programs. These young people can be moved, not pushed, but when they find there is an opportunity they want to take, you fill your classes. From there on, with the preparation they have, there is the result of fewer dropouts, better morale, and best of all satisfied graduates and satisfied employers. That is one out of ten; you can still place about five to ten students for every one that is being graduated from real good programs in this nation today. This is a measure of our problem.

THE NEED FOR TECHNICIANS AND THE UTILIZATION OF PRETECHNICAL PROGRAMS AS A RECRUITING DEVICE

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The Objective of this presentation is to point out that:

1. There is a terrific need for technicians.

2. An analyzation of the source of technicians places the burden on the colleges for increasing the supply of technicians.

3. Practices which have been used by colleges to increase their output of technicians as well as to improve the input from the recruitment program.

If one were to read the "positions available" section of the Sunday paper, one would see many opportunities for engineers and technicians. In fact, it is not difficult to believe that the demand for such people must fall short of the supply. The sizes of the salaries quoted for the services for these people is a second indication of a shortage of technicians and engineers. In fact, there is an even greater shortage of technicians than engineers.

Several surveys have been made which illustrate the industrial need for technicians. A survey in 1963 indicated a use of .66 technicians per engineer or scientist and predicted the ratio to increase by 1975 to a ratio of .71 technicians per scientist or engineer.

Another survey made by the American Society of Engineering Education in 1957 indicated industry desired to achieve a ratio by 1967 of almost two technicians per engineer or scientist, which would have represented a technical labor force of approximately 4,000,000 technicians. It is interesting to note industry fell short of this goal in 1967. This ratio has not been achieved and may not be achieved by 1975.

Since Germany and Russia are competing with us in world and local markets, it might be valuable to note how they are making use of technicians.

Germany is said to be now using 1.5 technicians to each engineer and scientist which was the ratio Russia was using in 1958.

By 1975 the West German group is expected to increase the use of formally trained technicians to 2-1/2 times our anticipated ratio or 1.75 technician per engineer or scientist.

Soviet planners are aiming for a 1970 ratio of 3 to 4 technicians for each specialist in the various phases of economic activities, whether it be industrial, transportation, agricultural or some other.

Apparently, industries recognize they have a responsibility in overcoming this technician shortage and are applying pressures in several directions. Beside increasing their training services, they are attempting to attract more people to the technologies.

IBM and several other companies are:

Developing a tremendous promotional campaign costing several million dollars to improve the image of the technician. This program will advertise in detail the opportunities available to a technician with the objective of improving the status of the technician. By bringing more respectability to the technician role, they are hopeful it will minimize parents influencing their sons and daughters to embark on a baccalaureate program, possibly to become a mediocre professional when in the long run they might excell as a technician and perhaps at a later date end up with a baccalaureate degree.

Also industries, such as IBM, are conducting long range studies of their needs for technical personnel. Such long range studies will make possible a uniform demand each year for technicians rather than one year of feast and the next famine.

Industries are taking a second look at college curricula to become more familiar with the details of the training being offered with the objectives of providing technical graduates with employment opportunities which will challenge their abilities and talents.

The case of "the need" for technicians is forcefully presented in the 1966 Department of Labor manpower report. The report not only describes need, but also presents information on the sources of the present technical manpower group.

The Soviets are planning significant increases in the enrollments of their specialized secondary schools. The 1970 enrollments are expected to increase 46% over 1965 admissions.

Specialists in manpower studies believe both Germany and USSR are increasing the effective use of their countries' highly trained minds by moving to this high ratio of technician to engineer and as a result, have a more efficient technical manpower mix than does the U. S.

There are many other predictions of a serious shortage of technicians worthy of note. Charles Bowen, manager of program development in the IBM Corporation, believes our economic expansion may be seriously retarded unless the United States takes immediate action to remedy this shortage.

He, along with others, points out the shortage of such critical manpower resource limits the capacity of corporations to create new jobs, expand facilities and productivity, and apply advanced technological practices.

It will be well for us at this moment to reflect on a statement made by Mr. Bowen, last year, at the National Clinic on Technical Education conducted at Albuquerque, New Mexico. He said:

> "Our country is entering a new era of economic development; an era where human resources have become more important than many other natural resources to the continued expansion of this nation and despite the billions the nations is spending on education and training, we lack any concerted, clear-cut manpower policy to determine priorities for our multitude of efforts in human resource development."

Dr. Torpey, manpower specialist in the executive office of the President of the United States, sees this shortage of technicians seriously hampering vital national programs, such as air and water pollution control, urban renewal and the space program.

The information in this report is misleading in some aspects due to a wide variance in an understanding of the term technician, but even so it is considered to be valuable and most conservative.

In 1963 there were approximately 845,000 technicians being used and listed under five major categories such as:

Draftsmen
Engineering
Physical Science
Life Science
and others.

These categories are self descriptive with the exception of draftsmen. "Draftsmen" might be considered to include both Industrial and Engineering Technologies since these are people used mostly on the drafting board doing tracing, detailing, checking or designing in any of the disciplines, be it electrical, mechanical, or other, carrying such job titles are draftsman, detailer, design engineer, engineering draftsman, etc.

This study reveals that in 1963, approximately 1/2 million, or 59% of the technicians were employed in engineering and physical science activities: about 1/4 million, or 30% were involved in draftsmen positions: 60,000 or 7% were involved in life sciences and .1 million, or 14% in other forms of technician activities.

Of this grand total of 845,000 technicians in 1963, about 45% were directly engaged in manufacturing industries. The remainder in non-manufacturing industries, such as consulting engineering, architectural services, business services, communications, government, and research.

This report contains a projection of need for technicians in 1976, which is predicted on the following assumptions:

1. A continued level of national economic growth.

2. Continued advances in science and technologies.

3. Further increases in the complexities of industrial products and processes.

4. Continual growth in research and development expenditures.

Based on these assumptions, the technical manpower requirements are expected to rise 75% between 1963 and 1975. In 1975 nearly 1-1/2 million technicians will be needed: Almost 3/4 of a million of these to meet the growth in requirements for new talent and about 1/2 million needed to replace people leaving this field due to retirement, death or to enter other employment.

These figures indicate a 6.4% growth in technical manpower will be needed each year, or roughly 86,000 new persons must be brought each year into this type of employment.

There will not be a uniform growth in need for technicians in all fields.

It is anticipated the engineering technology group must expand 73%; whereas, the draftsmen group must expand 62%; while the life science group of technicians must increase 193%.

These figures seem astounding in themselves but can be readily accepted if we pause a second to examine today's industrial world.

The complexity of the engineering problem today can be readily comprehended if one were to realize the total engineering and scientific knowledge has more than doubled in the last decade. This quantity of information is too staggering for a single individual to master and apply as was possible 30 years ago. The only successful way this mass of knowledge can be skillfully utilized is to develop a working group of persons each possessing a segment of this knowledge in "depth." In engineering, this group is called an "engineering team" and consists of scientists, engineers, technicians and craftsmen.

The increasing complexity of modern industry and the development of compex equipment, coupled with the rapid acceleration of today's technologies, requires more highly trained persons than was needed 20 years ago. Examine the appliances you buy for your home and compare them with similar items made twenty years ago. You may have been a successful home service repairman 20 years ago but this may not be possible today due to the increasing complexity of products.

Since it is predicted our country will need over one million more technicians by 1975, with the present supply of technicians falling far short of the demand, it seems logical to examine the present source of technical manpower and to analyze their potential to expand their outputs.

This Bureau of Labor study reveals the sources of technicians in 1963 to be as follows:

1. 50% came from re-evaluation of employees' abilities and skills which resulted in many workers being upgraded and promoted.

2. 24% resulted from in-service company sponsored educational programs

3. 18% of the technicians came from post secondary technical programs

4. 7% came from college and university programs

An analyzation of the first source indicates industry under the pressures of an increased demand for technicians has re-evaluated many job specifications. In doing this they found many specifications called for more education and technical background than was needed for the job. This represented a misuse of trained manpower.

By rewriting job specifications, may persons were up-graded. This activity also freed many engineers to work in areas more compatible with their abilities and backgrounds, while at the same time creating more opportunities for the employment of technicians.

This process of re-evaluating job specifications is not a simple problem in a rapidly changing complex industrial society. It often results in one job being subdivided into two or more, depending on how the changing technology has complicated the activities of a position. While this subdividing of jobs creates more job openings, it also reduces the number of available persons for up-grading. This job re-evaluation process had the effect of "up-grading" the "up-grading" process and reduces the potential numbers of persons who can be re-classified and their jobs "up-graded."

Another situation working against the "up-grading" process of the present semitechnical work group is, the average age of the unskilled labor force is becoming younger each year. The work force now contains fewer and fewer persons who have acquired a depth of "on the job" experience which can be used as preparation for advancement or "up-grading."

Industrialists believe that regardless of the diminishing supply of experienced workers, the supply of college trained technicians will be so limited it may be necessary to continue the up-grading of employees for awhile at the ratio of one employee for every two entrants.

There is no doubt but industries may increase their training activities to prepare new entrants even though current information indicates thoughts to the contrary.

Even if industrial training programs are expanded, there is some question if this will materially increase the supply of new technicians since the increasing complexity of the jobs technicians now perform requires a continuing amount of industrial training to keep up-dated. The bulk of industrial training in the future will be needed just to keep their employees abreast of technological changes.

In analyzing the possibilities of acquiring a substantial increase in technicians from the military source, it is necessary to realize the military training is specifically for military use and is not too adaptable to civilian employment.

Regardless of the type of training being offered, the Labor Department sees very little promise of increasing, percentage-wise, the number of technicians available from the armed forces.

The number of graduates from non-tech programs or dropouts from colleges and universities entering the technician stream may increase due to the attractiveness of technician salaries versus salaries offered for other types of employment. However, this will not represent too many persons.

Educators must be concerned over the short supply of technicians since a country's increased use of these persons represents an increased sophistication in the use of trained manpower and allows for a closer match of the training and abilities of persons with job requirements and results in a more efficient use of trained minds.

Education also realizes the major results a nation may expect from an effective mix of technical manpower is more goods, cheaper goods, better living environment, better health and many other things which make for a better society, not only at home, but in the whole world. These are the forces which justify education.

In comparing the yearly projected needs of 86,000 new technical entrants with the projected yearly average supply from all sources of 69,300 new technicians, there is a deficiency of 16,700 technicians per year which must be trained and put in the technical labor stream each year if we are going to keep our country in business.

I have been told even these projected numbers are conservative numbers and no doubt should be tripled if we are to achieve the effective manpower mix of our major competitors, West Germany and Russia.

A great share of the burden for increasing manpower development must fall on the nation's school system. This does not represent an impossible task but does represent a real challenge to develop more effective and efficient practices in the training of students. They are presently training and will have available in the future.

The following examples represent results which should be improved:

There are now over 450 schools offering college level technical programs enrolling over 100,000 students. National statistics indicate only 30% of these enrollees will ever graduate. All of these students showed promise of being able to do technical studies, otherwise, they would not have been enrolled. If this attrition factor could be improved by 16%, the gap between supply and demand would vanish. Usually attrition rates can be reduced through minor changes in a school pattern of operation. If an improvement of a few percent could be made in the attrition rates of a college, this would result in a significant increase in the supply of technicians.

In 1963, 25,000 students graduated from two-year college technical programs, with only 2/3 of them entering technical employment. Although 5 to 10% of these graduates continued their formal training, why isn't it possible to increase the over all percentage of technical graduates entering technical employment.

The burden of supplying more technical trained people for industry must fall on formal training organizations either in training departments of industry or in technical or community colleges.

It is apparent tech colleges should be able to improve their output of technicians by reducing the attrition figure.

However it is also possible for such schools to increase their output of technicians if they can increase their input of students.

A factor which seems to work against increasing the input of tech programs is the usual high academic requirements for admission.

In many instances the entrance requirements of most technical programs are such that colleges experience difficulty in finding qualified high school graduates to meet their quota. Last year I visited a large number of colleges offering technical programs. In exploring their recruitment practice, I believe it is safe to say that most technical curricula could have handled 30 to 50% more students with existing facilities.

In many instances the entrance requirements for technical curricula were equal to those of many engineering colleges and from a recuritment standpoint, the four-year college can offer greater attractiveness than the two-year college.

At Alfred Tech we have done something about entrance requirements which has increased enrollments in the technical curricula. This was brought about by introducing multilevel curricula in several disciplines.

An examination of our multitrack curriculum in Mechanical Technology reveals a Mechanical curriculum being offered under three different titles:

1. Engineering Science

2. Product and Machine Design Technology

3. Drafting and Design Technology

Each of these curricula are Mechanical Engineering oriented and each one designed for a different level of high school preparation.

First Level The Engineering Science curriculum is for exceptionally well prepared high school graduates possessing four units of high school mathematics and three of high school science. This program allows a student to concentrate on college calculus and physics, strength of materials, statics and dynamics, and prepares him for entrance into junior engineering and research lab positions with research centers, or again can represent the first two years of education in any engineering college.

Second Level A curriculum known as Product and Machine Design is for high school graduates having three units of high school mathematics and two units of high school science. The introductory math in this program is a concentrated course in college algebra and trigonometry followed by descriptive geometry and introduction to calculus during the first year. The second year continues with the calculus. The engineering materials presented in this program are in tune with the level of the math being presented. Students graduating from this curriculum enter high level type technical engineering positions. Some of these students transfer to four year colleges. Complete transfer is offered toward degrees of Bachelor of Science in Engineering Technology and in some instances complete credit is transferred to some school offering Bachelor Degrees in Engineering.

Third Level The third level curriculum is called the Drafting and Design curriculum. Prerequisites for this course are two units of high school mathematics. The engineering materials in this curriculum are presented at a mathematical level compatible with college algebra and college trig. Persons completing this program are employed in the lower levels of Engineering Technology positions and at high level Industrial technology positions.

We are now considering the introduction of a fourth level curriculum which will carry the title of Drafting Technology. This will require as a prerequisite a high school diploma and the recommendation of a high school counselor. This program will train people to enter employment in many of the industrial technician areas under the title of draftsman. The math level for this curriculum will start with select topics in arithmetic and progress through select topics in algebra, geometry and trigonometry. This multitrack approach to Mechanical Technology opens the door to any high school students having a desire to become a Mechanical Technology technician.

The enrollment in the D and D program is almost triple the enrollments in either upper level group. If this is an indication of what occurs if entrance requirements are reduced, the lowest level tech program "Drafting Tech " should be most popular.

In our experience with this system it is not uncommon for a student successfully completing the first year of a curriculum to seek entrance into the first year of the next higher curriculum. This indicates to us most students do not mind spending an extra year in college if it results in their up-grading their education. It is most certain they will spend an additional year at our school preparing themselves for a curriculum rather than return to high school to overcome entrance deficiencies.

We have been questioned in operating this multitrack program if we are not possibly turning out lower level technicians than can be achieved with a single curriculum.

The answer to this is " no." In fact, multitrack systems offer an opportunity for homogenous grouping. Through homogenous grouping it is possible to present the engineering theories at different levels of mathematical application in tune with the student's aptitude and achievement and thereby keep the program at its highest engineering level of

presentation. This approach to a curriculum allows a course to be presented at a challenging level compatible with the aptitude and background of the student, rather than having it either too easy or too difficult.

Another question we often have to answer is the acceptability of the lower level group by industry. The answer is direct, the demand for the lower level technicians exceeds that of the upper group. Industry is most happy to have them since by virtue of their background they are more apt to stay near their training objectives or existing jobs than the others who have a more intensive background and are seeking situations involving rapid advancement or possibly the opportunity to go on for a B.S. degree in Engineering.

The multitrack system in a discipline works fine in attracting high school students and reducing attrition but has the limitation of presenting scheduling problems for without an adequate supply of incoming students, administration will be faced with having to operate classes too small to be economically feasible.

In areas of concentrated population there should be no problem in attracting ample students for such a program.

The major objection to a multitrack system can be overcome by introducing a single curriculum known as a pretechnical curriculum which is especially adapted to small college use; and, it is equally successful in colleges possessing large technical enrollments. This curriculum will be a base or feeder curriculum to all other technical curricula in the college and is not designed for any particular discipline. It can be used as a springboard for inadequately prepared students to enter any technology curricula.

A pretechnical program provides a way for students with scholastic difficulties to overcome their difficulties and secure work which will complete the entrance requirements of the curriculum of their choice. It is worthy of note that not only does this program provide an opportunity for a high school student to prepare himself academically with subjects not secured during his high school experience, but provides an opportunity for high school students with weak subject preparation to strengthen their background through re-exposure to these subject areas. Again, this type of program can be most valuable to the returning veteran who has been away from high school for several years and needs an opportunity to review elements of his high school background.

The U. S. Office of Education indicates that 40% of all high school graduates are considered capable of handling collegiate programs in the technologies. In our state we are not enrolling 40% of the high school graduates in technological programs.

In this group of high school graduates who are capable of handling college level technical programs, many qualify as having underdeveloped scholastic skills; and therefore, cannot qualify under present academic requirements. There are many reasons why these students do not possess

adequate preparation in required subjects qualifying them to enter technical programs, such as:

1. They did not know they needed them.

2. They did not realize they were important until it was too late to study them in high school.

3. They considered the courses unusually difficult and consequently avoided them.

4. They changed their college objectives too late to secure adequate preparation in high school.

5. The schools they attended did not offer required courses or perhaps such courses could not be scheduled, making it impossible for the student to take certain courses.

In this group there is another large segment of graduates who fall under a different set of circumstances for being underdeveloped scholastically, such as:

1. Late maturity, sometimes known as late bloomers. These people had no serious vocational objectives in high school.

2. Persons having an underdeveloped interest in organized study. In this group will be found persons who spend a large portion of their time in part-time or full-time employment causing their school records to become low. Such persons might be those required to work on the family farm or in the family business. Here we find students whose income is needed for family support. Also in this group is the student earning money to support a hobby, or for some other compelling reason.

3. There is still another segment of students in the underdeveloped group with high motivation toward mechnical or scientific activities (ham radios, photography, hot rod automobiles, livestock, etc.) who because of a consuming interest in these activities have not concentrated on language, mathematics, or organized sciences. Students in this group are some of the most promising students for technical education programs.

4. There is apparently another group of students who are not high school graduates but possess abilities and aptitudes for technical education. In this group we might find students who have left high school to enter employment or the armed services, or through misfortune have had to assume responsibilities preventing them from remaining in school. People in this group, in many instances, have developed a maturity in work habits, possess stability not found in the ordinary high school person, and often have a strong motivation to return to school to better themselves academically. A pretechnical program should be a program designed to help these underdeveloped students strengthen their background in mathemtaics, science, reading, speaking,

basic study skills, or whatever areas are required to qualify them for entrance into technical programs.

In general, students who have underdeveloped skills are usually considered less able than others because they have not learned the skills with which they can pass academic tests and thus, a review of their high school performance indicates them as persons possessing low ability.

This is not always the case but more often represents the inability of a high school program to motivate a student scholastically. It is not unusual to find these underdeveloped students improving their scholastic motivation as they find reading, mathematics, and science courses directly related to their speical hobby interests. When this realization occurs their concentration in these areas increases as an opportunity for enlarging the horizons for their hobby specialists.

The pretechnical program is designed for students not immediately prepared to enter technical programs and should always be considered a curriculum designed to offer a way for underdeveloped students to prepare themselves to become technicians and in doing this will perform several important functions.

1. It will permit able students to overcome deficiency in their educational preparation and thus successfully prepare them to enter technical programs.

2. It will increase the total number of students who are qualified to enter high quality technical programs.

3. It will provide more and better trained technicians for the future labor force.

At Alfred State Tech, we have found that the use of a pretechnical program has provided our college with several distinct advantages:

1. The pretechnical curriculum provided a source of a larger number of qualified students for the regular technical curricula which nicely supplemented the input from the high school of fully qualified students.

2. Increased enrollments in the technical curriculum permitted the graduation of a larger number of highly skilled technicians.

3. The pretechnical curriculum allowed our Admissions Office to more carefully grade the students admitted to technical curricula. Those who did not quite come up to admission standards were admitted to the pretechnical program. This reduced the first year attrition rates. This is very important since the first year attrition rates in many tech programs ranges between 40% to 60%. Such losses in many colleges have resulted in uneconomical practices, by requiring instructors to teach second year classes too small to be economically feasible. By having a pretechnical curriculum in a college, it is possible to

reduce attrition rates in the first year by being able to move students who are having difficulty in a regular curriculum into the pretech curriculum rather than dropping them from school. This does not shift the problem of "dropping a student from school" into the pretechnical program completely, since 75% of those so moved make the grade.

4. The technical curriculum can be maintained at a high quality level when there is an opportunity for the incoming students to strengthen their academic preparation for admissions. This results in turning out high quality technicians.

5. The pretechnical curriculum aids in the recruitment of students for certain specialized fields of technology which under normal practices have experienced difficulty attracting students. During the pretechnical programs, students are offered an opportunity to acquaint themselves with the technical offerings of the college and find these curricula attractive.

6. A college offering pretechnical programs wins favorable support from parents, high school administrators, counselors, employers, and others. The pretechnical program provides an opportunity for youth to overcome educational handicaps in a more mature environment than a high school. This is most important since most pre-tech students would never consider returning to high school. This type of program is regarded by many as a special service to the youth of the community.

A successful pretech program should contain courses or experiences which will provide the following:

1. An opportunity for a student to develop certain skills.

2. An opportunity for a student to develop certain attitudes.

3. An opportunity for a student to develop a background in subject deficiencies in his or her educational background compatible with the prerequisites to the curriculum that they wish to enter.

Although these 3 objectives are interrelated, each should be considered separately to insure that adequate emphasis is applied in each area. The skills which are usually deficient in persons enrolling in a pretech program include underdeveloped reading and study skills. A pretech program should be designed to provide an opportunity for a student to improve these skills.

Usually the attitude of a pretech student on entering college is inconsistent with good practices to insure high performance. Opportunity must be provided in a pretech program for a student to develop: a special interest in his field, ambition, integrity, intellectual honesty, confidence, inquisitiveness, and willingness to work and study systematically.

The third objective of a pretech program is to provide an opportunity for students to study subjects which they have not previously studied or

perhaps have not amply mastered to a degree required for meeting academic entrance requirements. In the Engineering Technology areas this might include such subjects as mathematics or physics and in the medical or chemical areas this might include courses in chemistry or biology. Whatever the courses might be would be determined by the entrance requirements to a specific curriculum.

Consideration should be given to presenting a pretechnical program as a full time program, a part time program, or a program which might be a combination of these 2 methods. It is suggested that a pretech program be presented as a full time one-year program since it offers many important advantages to a student not otherwise available. For example:

1. The student who is totally committed to a program is usually found to be more serious and conscientious when it becomes his total daily experience.

2. Students involved in full time pretechnical programs have a tendency to develop a normal identification with other students in a college situation. Such an identification usually results in a student more easily adjusting to the responsibilities of a full time student.

3. Full time students have a greater opportunity to explore the ingredients of technical curricula through exposure to laboratory facilities, library materials, trained counselors, and others.

4. A full time program shortens the time a student will need to overcome his educational deficiencies. This will enable him to become a skilled technician and obtain more gainful employment in the shortest possible time within his capabilities.

5. As a full time student, I believe a person can more easily qualify for certain state and federal scholastic aid funds.

6. Students involved with full time programs may find training more effective since the faculty of a full time program are usually more dedicated to the teaching of technological studies and this being their full time employment usually are more effective teachers and counselors.

A pretechnical program for students interested in engineering technologies will include the following studies which continue throughout the year unless otherwise designated.

1. A course in study skills and remedial reading practice. This course will occur during the first semester. Intensity of program will be determined by a student's needs.

2. A course in the fundamentals of communication skills which might be a course in basic English or perhaps a freshman English course depending on the student's background and proficiency in this area. This could be a 3 credit hour course scheduled one hour on Monday, Wednesday, and Friday.

3. A physics course requiring one hour lecture each day and two 2-hour laboratories each week.

This is basically a strong high school physics course with emphasis on developing a scientific curiosity and providing much experience in problem solving. The topics can be arranged in the order of heat, light, sound, mechanics, electricity so that the math program can have an opportunity to develop mathematic skills before they are required in the problem solution portion of this program.

4. The student schedule should include one clock hour of mathematics each day starting with the review of fundamentals of arithmetic followed by selected topics in algebra, geometry, intermediate algebra, and trigonometry.

5. The pretech curriculum should include a course in a technical specialty. At Alfred State College we used drafting as this technical specialty. This was a 3 credit hour course extending throughout the total year and designed not only as a college credit course but also as one carrying job placement potential. On successfully completing this course the student had adequate preparation to secure a low level job in the field of drafting. We found this course a valuable incentive to students taking the pretechnical program. The incentive being that, should they not be successful in developing a level of mathematics and science compatible with the entrance requirements of the curriculum they were interested in entering, they at least had received a training which provided them with enough background and skill to enter technical employment. This, in many instances, justified in a student's mind his gamble of time and money in taking a pretech program.

The clock hour and the credit hour load in a pretech program should be slightly lighter than a normal technical program. It should be recognized that a pretech student is not as well emotionally prepared for school work as a properly prepared high school student and should have time made available for adjusting himself.

All of the courses in a pretech program require homework exercises similar in amount to a regular technical program. Usually the classes are kept intentionally small during the first semester so as to provide as much individual-student assistance as possible. In some instances laboratory periods have been lengthened to provide a form of study hall atmosphere where a teacher is immediately available for student assistance.

Since all pretech students may not have identical scholastic deficiencies adjustements in scheduling are necessary. For example, a student who has two units of high school mathematics may not profit by taking the first course in pretech mathematics. In this case he will elect some other credit course during the first semester and then would take a pretech mathematic course during the second semester. The success of a pretech program is flexibility and freedom to make schedule adjustments as needed. This assists in maintaining high student motivation.

When a college is operating a pretech program it is possible to take a gamble on a student's abilities without seriously jeopardizing his future or creating an unnecessary penalty of training time. For example, it is possible to enroll in regular tech programs requiring extensive math and physics high school preparation, students who were exceptionally strong in math accomplishments but devoid of high school physics, without jeopardizing their educational future. Seventy-five percent of the time these students overcome the lack of physics knowledge while studying the college physics program. This was possible since their exceptional ability in mathematics required less than average study time in math and thus, used the savings to master physics. If this student had not been able to handle the regular program, he would have been shifted into a remedial program during the second semester without penalty. In the first instance he would have completed a tech program in 2 years instead of 3.

Counseling is a continuous service in a pretechnical program. A student should be counseled before coming into the program, tested, and counseled on entering the program and counseled throughout the program. The initial counseling will require the services of professional counselors. These people should be very familiar with the employment areas of the technologies as well as have the potential to be teachers. The teachers teaching pretechnical courses fulfill most of the role of counseling during the student's school experiences in the program. Definite student teacher counseling assignments should be made so teachers will concentrate on a small segment of the pretech group and provide much individual attention. Usually, the teacher during his counseling meetings with students assists them in selecting the technical curricula that most nearly matches their potentials and interests. Through close counseling it is possible to identify at an early stage the student who is having scholastic difficulties. The ease and speed with which adjustments can be made usually improves the effectiveness of the program.

Teachers who are successful in teaching engineering subjects do not always make the best pretech instructors. In our pretech program we had the most success by using persons who had been high school teachers with a fairly broad knowledge of industrial experience; possessing characteristics of patience, sympathy for the slow learner, and an understanding of people. It is also necessary that these teachers have a strong subject background in the courses they are teaching and a knowledge of how these are used in engineering.

The Vocational Act of 1963 makes clear in its statement of purpose that programs for students with special educational needs can be supported as they prepare for gainful employment. Pretech programs can be supported under the Vocational Act of 1963 in any state if the state plan makes provisions for such programs. For the pretech program to qualify for support under the act, the institution which teaches technicians must provide remedial courses as a part of the overall plan for educating technicians. Pretech students must make application to the institution with the declared objective of entering a technical program.

The success of a pretechnical program will reflect the interest of the college's administration in such a program. Where the college administrators have been convinced of the need for such a program, such programs have flourished.

Our college's success with the program indicates it is possible to increase the present enrollment 20 to 40%. Our experiences indicate that over 2/3 of those who enter a pretech program successfully complete an Associate Degree program. With a "backing up program" such as a pretech program the attrition in the regular technical programs can be reduced to very low levels and the quality of the technician training maintained at a high level.

The cost of implementing and operating pretechnical programs is nominal. No doubt, every technical college has a physics laboratory with free time in its weekly schedule for accommodating more sections in the program. Possibly the problem of finding classrooms for lecture instruction will be difficult and under certain circumstances unsurmountable.

Finally, when a school inaugurates a pretechnical program, it should become a practice of other students and teachers to consider the pretech students in the same light as all others, and not as a segregated group of misfits. When these students are recognized on the same plane as others, they seem to blossom forth and have an extreme desire to participate in school activities and excel in their college work. The employer favors the graduate who has taken a pretech program since students from this program are more mature and generally have industrial experience which allows them to more rapidly adjust to the working conditions of employment.

In this period when the demand for technicians far exceeds the supply, technical colleges should be searching for ways to increase their output of technically trained minds. By the introduction of pretechnical curricula, many colleges have been able to fulfill their desires of increasing the number of technical graduates.

Suggest a copy of "Pretechnical Post High School Programs" be secured from the U. S. Office of Education, Division of Vocational and Technical Education, Washington, D. C.

DIRECTED STUDIES: INDIVIDUALIZED REINFORCEMENT

Dr. Arthur Pollock
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St. Petersburg Junior College
St. Petersburg, Florida

I. Philosophy of the college (commitment from "the top")

A. Open door policy

1. Educationally disadvantaged student
   a. Weak background overall
   b. Weak in a specific subject area
   c. Often economically disadvantaged
2. Implications for college administrators
   a. Small teacher-pupil ratio
      (1) Always costs more money
      (2) Sometimes causes faculty unrest
   b. Little or no extra expense for student (department library)

B. College credit earned

1. Institutional, with limits (6)
   a. "S" - 3 hours, no QP
   b. "N" - 0 hours, audit
   c. No "F's"
2. Not transferrable as meeting general educational requirements

II. Philosophy of the department

A. Empathy of the instructor (extremely important)

B. Individualized instruction as much as possible
   1. Lab atmosphere
   2. Tables instead of individual desks

C. Student motivation
   1. Non-transferrable credit
   2. Self-satisfaction (success with programmed material)

D. Scheduling of classes
   1. Four periods per week
   2. Fifty-minute periods
   3. Twenty students per section

III. Aims and objectives of Directed Studies courses

A. DS 50, Communications Laboratory
   1. Increased reading speed and comprehension (done individually with machines and materials)
      a. Skimming
      b. Scanning

c. Inferring
d. Vocabulary

2. Improved study skills
   a. SQ3R
   b. Note-taking
   c. Outlining
   d. Underlining
3. Improved listening skill (#2 done largely through tapes)

B. DS 60, Contemporary English
1. Improved mechanics for composition (done individually with programmed material based on diagnostic tests)
   a. Grammar
   b. Usage
   c. Sentence Structure
   d. Punctuation
   e. Spelling
2. Improved composition (expository)

c. DS 70, Fundamental Mathematics
1. Review of basic mathematical and algebraic skills and concepts
2. Progress through quadratic equations in preparation for freshman math course

IV. Registration procedures by college counselors

A. Pre-judgment of student records, guidelines
1. DS 50 (general weakness in reading and study skills)
   a. High school grades barely passing
   b. SCAT, below 20th percentile in linguistics section
   c. Davis Reading Test, below 20th percentile
   d. Florida Twelfth Grade Placement Test (FTGP), below 250 (possible 495)
2. DS 60 (specifically weak in English composition)
   a. High school English grades of "D", but "C" or better in other subjects.
   b. SCAT, below 20th percentile in linguistics section
   c. Davis Reading Test, below 20th percentile
   d. FTGP, below 250
3. DS 70 (specifically weak in mathematics)
   a. High school math grades of "D" or little math attempted
   b. SCAT, below 35th percentile in quantative section
   c. SPJC math test, Part I under 10, Part II under 8
   d. FTGP, below 250

B. Interview with student (Courses are <u>not</u> compulsory, thus counselor "sells" student on need for a course)

V. Methods of instruction

A. DS 50

1. Pre-test and profile chart
   a. Diagnostic Reading Test
   b. Iowa Silent Reading, Advanced Test
2. Reading pacers used (speed settings increased if student achieves 70% on tests)
   a. Craig Reader and Program "A" (Craig Corporation)
      (1) Tachistoscopic work
      (2) Article read and comprehension test taken
   b. Controlled Reader, Jr. with filmstrips "GH," "IJ," "KL," "MN" (Educational Development Laboratories)
      (1) Previewing
      (2) Article and comprehension test and vocabulary test
   c. Accelerator, Model III with Better Reading Book series (Science Research Associates)
3. Other materials encouraging speed
   a. Design for Good Reading, Levell II (Harcourt, Brace, and World, Inc.)
      (1) No mechanical device used
      (2) Comprehension and vocabulary tests
   b. Rate Builder, component of Reading Lab IIIa (Science Research Associates)
      (1) No mechanical device used
      (2) Three minutes to read and answer ten questions
4. Constant reminders about varying reading speed according to purposes for reading
5. Vocabulary development
   a. Power Builder, component of Reading Lab IVa (Science Research Associates)
   b. Words, a programmed book (Science Research Associates)
6. Study skills
   a. Following Directions, a programmed book (California Test Bureau)
   b. The Dictionary, a programmed book (California Test Bureau)
   c. Listen and Read, tapes M-P (Educational Development Laboratories)
7. Student responsibilities
   a. Follow the Work Guide (individualized)
   b. Keep the Work Record current (daily)
8. Post-test and profile chart

B. DS 60

1. Pre-test and profile chart
   a. Missouri College English Test
   b. Green-stappe Language Abilities Test
2. Materials for mechanics, programmed books (student must achieve 70% on each or re-do the material)
   a. English 3200 (Harcourt, Brace, and World, Inc.)
   b. Problems in English Grammar (Charles E. Merrill Books, Inc.)

c. Punctuation (California Test Bureau)
d. Capitalization (California Test Bureau)
e. Sentence Patterns (California Test Bureau)
f. Verbs, Number, and Case (California Test Bureau)

3. Materials for spelling
   a. Spelling Improvement, a programmed book (McGraw-Hill)
   b. Spelling Word Power Lab III (Science Research Associates)
   c. Spelling and Vocabulary (Chandler Publishing Company)
4. Vocabulary development
   a. Programmed Vocabulary (Appleton-Century-Croft)
   b. Spelling and Vocabulary (Chandler Publishing Company)
5. Composition, theory
   a. Writing Skills Labs (Science Research Associates)
      (1) Description
      (2) Exposition
   b. Shaping College Writing (Harcourt, Brace, and World, Inc.)
   c. Contemporary Composition Program, transparencies (Science Research Associates)
6. Composition practice
   a. Minimum of ten, 150-200 words
   b. Corrections
      (1) No grade; many comments (starting with "good")
      (2) Logic and organization as important as mechanics
   c. Individual student-instructor review of each composition (the key to the course's success)
   d. Student self-evaluation after five compositions
7. Student responsibilities
   a. Follow the Work Guide (individualized)
   b. Keep the Work Record current (weekly)
8. Post-test and profile chart

C. DS 70

1. Pre-test, Lankton
2. Materials, programmed (student must achieve 70% on each departmental unit test or re-do that unit)
   a. TEMAC First Year Algebra, 5 vols. (Encyclopedia Brittanica Press, Inc.) or Algebra-Programmed, 2 vols. (Prentice-Hall)
   b. Modern Elementary Mathematics (Allyn and Bacon)
3. Post test

VI. Evaluation of Directed Studies after two years (as of end of Session I, 1968)

A. DS 50 (reading and study skills)
   1. 380 students made average gain of 18 percentile points, 66 of those gaining 30 or more points (Iowa Silent Reading, Advanced Test)
   2. 344 passed course - 148 (43%) still enrolled at college

B. DS 60 (composition)
   1. 347 passed the course; 96 failed
   2. Of those passing, 152 (44%) made "C" or better in freshman English
   3. Another 37 (11%) received "D's."

C. DS 70 (mathematics)
   1. 324 passed the course; 300 failed
   2. Of those passing, 115 (35% earned "C" or better in freshman mathematics)
   3. Another 17 (5% received "D's")

D. Overall evaluation - successful (pleased but not satisfied)

VII. Main reasons for success

A. Commitment from college leaders

B. Counseling by those responsible

C. Dedicated instructors

VIII. The future

A. Social science course

B. Natural science course

IX. Need for post-secondary remedial programs

A. Over-crowded schools K-12; over-worked teachers

B. Late-blooming students

"I have an outline that is coming around and in the back if you will save any extra copies, I use them to start the fires in the winter.

"While that is being done I can re-emphasize the position of our institution, St. Petersburg Junior College. As Mr. Young mentioned it is forty-two years old, and it has been traditionally university-paralleled. Only in about the past ten years has anything been done with the occupationally-oriented technical programs, and they are growing rapidly. But, because of this tradition, we have a recruitment problem. College is supposed to be four years.

"I. - Philosophy of the College. You wouldn't be here if you were not interested in remedial work -- but, number one, we are trying to indicate that to be successful you have got to sell your commitment to the top level. Again, using just a personal illustration, at our College, Dr. Michael Bennet, the President, more or less pushed this program, and because of his interest he has sold it to the Dean of Academic Affairs, the Dean of Instruction, and all the deans. We are getting much help. I will mention financial help in just a few minutes, but this is important. If your school is going to start something like this and do anything with it, you have got to sell this commitment to the top staff, starting with the President.

"A. Many of you are from open-door institutions, as ours is, and with that you are getting all kinds of students. We are interested in the educationally disadvantaged. Some of them have a weak background overall for various reasons; sometimes, it is home environment; sometimes, it is school environment. It doesn't make any difference. Some come only with a specific weakness. Usually, it works out this way, the boys come to us, many of them interested in math, science but despised English all through high school. They never had to write much as far as composition or theme development, so we try to work with them in that particular area. On the other hand we get very many girls who in English and social studies do very well, but they took a general math class in the 9th grade. That was the end of math, and they cannot do the freshman college math. So, sometimes they are weak overall, sometimes they are weak in a specific subject and often, not always, they are economically disadvantaged.

"What are the implications for college administrators? Well you need, if you are going to do remedial work, in most cases, a rather small instructor-pupil ratio and, of course, that costs money. It is here that we start to get this commitment from the top. We had a maximum class-size of 20. It started out 25, but this was too many. We would like to get it down to 15 or 18, but 20 is reasonable. This costs money for your college administrators. They have to get a few more instructors to handle the smaller classes.

"And, number two, is a factor, some of you are probably familiar with it - faculty unrest - which relates to this class size. Again, here is where you need your commitment from the top. The English

instructor in the ordinary English class, may have four sections of 30 to 35 students and meets them three times a week, and here is the other fellow who has the remedial class, and has only twenty students and he meets four sections. Again, a commitment from the top helps. Here is a point that is controversial. It's a little bit too strong - ambiguous may be a better word.

"Throwing out suggestions, you adapt them to your situation, but for instance, our students do not purchase books. We have a library of our own. Again, it is expensive. You have 100 copies of a certain book to deal with, let's say 200 students. This again requires finanical commitment from the top. They have got to give you the budget for it.

"I mentioned the ambiguousness of this policy. We are beginning to think that maybe it would be better to ask each student in each remedial course (we call them directed studies) to purchase a key textbook. In other words, make him put forth a commitment and investment. Right now, we check the books out of our departmental library. Any student who needed remedial help when he came out of high school and who is in an economically disadvantaged situtation need not hesitate to come to college and worry about having the buy textbooks. Because (you are going to see later I have outlined for you the type of thing that we do) we use many different books in remedial work, and asking students to buy all of these books is almost impossible. This is something that you are going to have to decide. We prefer making it available free on a check-out basis.

"B. The college credit earned: With a philosophy of "open-door" we are going to try to help; we feel that we must offer some kind of credit. *It is difficult to ask students to come and then say*, "O.K., we want you in the college, we would like to have you, we think we can help you, but it is going to take you a semester or a year before we even acknowledge that you have been here as far as credit goes." So, we offer institutional credit. An "S" means satisfactory progress. We give them three hours credit, and they can total six hours and apply it toward graduation under certain program. It is not transferable. We make that clear to the student from the beginning. He cannot transfer it to any of our State institutions and certainly not out of State.

"S - satisfactory progress - what is satisfactory? There are two ways to look at it. In one case when we assign this student a grade of S we are saying, "O.K. in our judgment, we think that you are ready for the regular freshman English, freshman math or whatever." If he gets an A, (which means audit) we say, "O.K. you have made some good progress, but there is no sense fooling ourselves, you are not going to succeed. Usually you will not succeed in this freshman English class. You are not quite ready for it."

"There is one other situation where we give an S, with reservation. We have many foreign-speaking students who come to our school. Some of these people start at the very bottom of a percentile ladder and they

will test out in the beginning 0 or 0-1, and at the end of one session they will be up to 10 or 15. That is tremendous progress. We don't feel that we can say, "look, you haven't made enough progress." This student has made tremendous progress. We give that student an S. We don't really give it to him. He has earned it. But, we tell him and we tell his counselor that he should continue - he doesn't repeat it - he continues with the course because he still is really not ready for the freshman-level course. So in this case we do give an S, although, we are saying you are still not going to be able to do the work in freshman level course. We feel that the psychological effect is better, and we have had success with this. These foreign-speaking students appreciate the fact that they have made enough progress to pass this course. They also, when you sit down and talk with them, realize that they are not ready for freshman-level courses.

"II. What about the philosophy of the department? Well, the first thing and the most important thing, of course, is the role of the instructor.

"I use the term empathy. You know many competent college instructors for normal average college classes who do not want to, and probably could not do, remedial instruction. They are just not with it. They are not interested. It is beneath their dignity. We have them at our college, fine instructors, but not for this kind of instruction. You have to pick instructors who want to do this. All right, you are interested. That is why you are here, but when you go back and start a program like this, this is the key. You have got to have instructors who want to do something like this, which is not glorious, high-level teaching that many people think of in college work. This is where you get down one to one and you instruct that particular individual where he is, and he needs a lot of help so you have got to have the instructors who want to do this kind of work. This is empathy, being able to get in the other guy's shoe and understand how he feels.

"We individualize instruction as much as possible. We use a lab atmosphere, tables and chairs, not in the traditional rows of desk where you look at the guy's head in front of you. We encourage informality. It is not a place where they come in and for 50 minutes just sit. They are going to be using this material for 20 minutes and when they finish it, put it back on the shelf and pick up another one. If they need help from a neighbor, go ahead and ask him. This is not testing, this is the programmed material that they are working with. It is an informal atmosphere.

"Student motivation in a remedial program (I am going to mention this in a few minutes) starts with counseling within the class, within the last situation you will find that the students enjoy succeeding. Remember, these are students who were pushed through high school. In many instances, they got the D, the D-, and I speak with knowledge, I spent 15 years in high school so I know. They attended school. They didn't cause any trouble, tried, not 100%, they tried 50%. They were promoted. There is no place to put them. You have to push them through. This is the sad fact. When they come into the program, a directed studies

course with the programmed material, they start to succeed. I am sure many of you have had experiences with programmed material; you have investigated it a little bit. This is one of the strong points of programmed material. It is a minute-step-by-minute-step and a student can be successful and he starts getting right answers and he gains a little confidence. This is a motivating factor for these students. Secondly, when they come in to us they have been counseled - you cannot transfer this credit. You are doing this to help you pass the freshman course that you can transfer or that you can use for the two-year program graduation requirement. They come in knowing that, so, they come in to work, they are not fooling anybody, they want to work because they want to get ready for freshman English, freshman math or whatever. So the motivational factor on the part of the student is one of the nicest things in doing remedial work we have found in our situation. These kids come in to work, so they buckle down. We get fellows from the service, who come to us and say, "Look, when I was in high school, I didn't even think about going to college. I didn't want to. I didn't like school. I didn't enjoy it. Now I have been in the service for four years. I have kicked around a little bit. I know what I need. I want a two-year degree or a four-year degree in such and such. My English background is weak, because I messed around in high school. Let's get with it." When they come in, they want to work.

"With a little housekeeping schedule in your classes, four periods instead of the traditional three, we feel it is like learning to drive in golf. If you can go out 30 minutes a day, it is much better than waiting until Saturday and spending two hours and then not going back until the next Saturday, the same as in tennis, swimming, anything. Fifty-minute periods - traditional - 20 persons per section, I have already mentioned.

"III. What are our aims and objectives? We have three courses. The first one DS 50, Communications Laboratory, increases reading speed and comprehension -- and comprehension. Now, when we talk about increased reading speed, we are not looking to the 1,000 words per minute thing which you read about. This is not what we are aiming for. If I had to put it down in figures, roughly somewhere between 350 and 400 words a minute. This is what the experts say you need to do all the outside reading that is required and understand it and keep up with assignments. If you read much slower than that, it is going to be tough. In this speed reading, (I use the term speed reading; it is not the 1,000 or 1,500, 2,000 words a minute kind of thing but 350 to 400) we work on things like skimming where you are getting an overall view of the material - the main idea, scanning where you look for specific information. You have a question and you know that the answer is in there somewhere, and you are looking for that particular piece of information, inferring, digging out material. This is more like the textbook kind of reading. You read a parapraph, and what did you dig out of it? Vocabulary, naturally, I didn't mention all of them. These are the four main things we work on in this speed reading and comprehension.

"We also, in this course, work on improved study skills. First the SQ3R system of study: survey, question, read, recite, review.

"Second, note taking. These students in most cases do not know how to take notes from lectures, and so much of the college work is lecture.

"Third, outlining. Whether an outline from lecture or from a textbook chapter, many of the students have never done it before. How do you go about an outline? What do you put down in an outline?

"Fourth, underlining. In high school, of course, they have been told, "Don't write in your books, because you have to turn them back in. Somebody else has to use them for the next ten years." In college, you are supposed to buy your books, and you keep them. So underline. They don't know how to underline, so we try to show them.

"We are just beginning to give our students a Brown-Carlson Listening Test. It surprises them how poorly they listen. The test is on tape which they listen to, and then they are supposed to answer questions. The answers have been given in the tape, but they didn't hear them. They didn't listen. We do this in the beginning to show them how important listening becomes.

"This is the DS 50 course. This is for the student who is weak overall - that is why the study skills are in there. He is going to have a hard time in English, in math, in social studies, in psychology, in government. He is going to have a hard time in college. He needs overall help.

"Next course is DS 60 which is aimed at the freshman-level English course that the students need to pass to graduate. It emphasizes improved mechanics for composition. They take a diagnostic reading test when they come to us. We'll find that some of them have problems in all mechanics. There is no sense in worrying about capitalization. They don't have any problems with capitalization, but sentence structure, yes; verb-subject agreement, yes; pronoun agreement, no this student doesn't have trouble with this, so why make him do the material? He knows that, he understands it pretty well - grammar, usage, sentence structure, punctuation, spelling; again, five of some of the things that are involved in composition and writing. The composition work they do is expository since we are aiming our course DS 60 for the freshman composition course. If they change the freshman composition course, then we will have to change our DS 60. It is basically expository writing, explaining, taking a stand.

"DS 70 is fundamental mathematics. Again we try to make it as practical as possible. We tell them when they come in, "Look, you are here for one purpose. You want to get ready to enter MS 110, which is the freshman math class that almost everyone takes. That is what we are trying to do, we are trying to get you through to quadratic equations so that when you go in to the MS 110, you are starting basically with the rest of them. From then on it is up to you.

"Here I think we come to a key point: registration procedures by college counselors. We rely on our college counselors to interview the students. I feel that these are professional experts in that field. So

I rely on their judgment, and it has been proved to work out fine. When they say a student needs a DS course they are right 95 per cent of the time. He needs it. Maybe the one word I would want to emphasize, in the prejudgement of students records - and you might want to underline it, circle, star it - is the word guidelines. These are only guidelines, these courses are not compulsory. The student selects them. We talked about this motivational factor before. He elects this. He does not get pushed into this. He has been pushed into courses all through high school, and he didn't like it and he didn't try. Now he is coming to college, and he is putting his money on the line. He is saying, "O.K., what do I need to get me through this thing, what help do I need, what can you give me?" He selects, he elects a direct studies course. These are only guidelines so that during the late spring and early summer when the high schools start sending the transcripts to the college and the college assigns 200 students to this counselor and another 200 to another counselor, and they start going through those records, the grades, the test scores, the college battery of test that they can recognize.

"Here is a possibility: This fellow is going to need help in math, this one in English, this guy needs help all over. So when they sit down and have this pre-registration counseling session, which every student must have, they can say, "OK, Joe let's look at the record." "Your high school grades in English - D's." Or, "You got a C, but you took basic English for three straight years. You are going to have a hard time in that EH 140, that's freshman English class, unless you get some help. You need DS 60 now."

"But, these are guidelines and there is no sense going through the figures, the percentiles. They are picked out of thin air and they seem to have worked. Now possibly we will have to change some of them in time, but you use different tests so this would be something that you would have to sort of play by ear. They are strictly guidelines, and I put them for the three courses. They are simply to make the counselor aware that here is possibly a student who needs help.

"The method of instruction: Here, I thought, is where we would get to the actual nuts and bolts, so that you have something to take back. Say you are thinking about starting a program and you have to talk with English teachers. Here is something that you can show them and they will be familiar with much of this material. Again, I point out a word here, I am not on the payroll of any of the publishers or any of the companies. This is simply what we have found to be effective. One of the pleasant things in this remedial instruction field is the fact that more and more of the publishing companies are coming out with good college level programmed text. For a long time the reading content was strictly junior and senior high school level. Now they are coming out with them at the college level, they are good - many programs for reading, for English, for math - they are excellent. These are just what we use. They have been good with us. We are not wedded to them. We can change if we ever want to.

"We give them a pretest in DS 50. We use two and either one of them is fine. We are now using "A" simply because of a time factor.

We can do the "A" test in one period. It takes about 45 minutes, counting instruction time. The Iowa Test runs over two periods so we changed. They are both fine tests. Based on what we find on these tests, what we know about test scores from the counselors, we know where to place them on reading and so on. Then we start in with the materials.

"We use reading pacers. With the pacers, the student sets his speed. After the diagnostic tests we have a fair idea of where to start. Some of them read at 125 words a minute, and have 40 per cent comprehension. They read at 125 words a minute but really didn't understand what they read. Some of them are up at 200 and 60 per cent; some read 75 words a minute and score 90 per cent comprehension. Such a student is never going to do all the reading that is going to be required in his college work. It is impossible. He is too slow. As with all other pacers, students read an article, and they set the machine for their speed - each person for his individual speed. After they read the article, they take a test and they correct their own test. We tell them as long as they can pass the test with 70 per cent, the next time they can use that machine and set the speed up. We usually go up 25 to 30 words a minute. They will move along until they get around 300, then they level off and have to do four or five readings. They have reached a learning plateau which, as you know, is part of learning theory. Then all of a sudden, they start moving up again. They will go to 325, 350 and then maybe level off again. As long as they can pass that test they move up.

"In all three classes, I think many of you would be surprised at the level of reading, of the materials. One of the first apprehensions I had was that this material is going to be too low, it is not going to be interesting. You would be surprised. Articles covering all kinds of subjects: the arts, sports, science, history, mythology, humor, everything. Students select, in many cases, what they want to read so that we start them off with things in which they are interested and in which they might even have a little background. At the end, they don't really care what they are reading because they have mastered enough they can understand and get the main idea.

"There are other materials that we use without pacers. Here they try to carry over this mechanical pacer speed reading to actual reading conditions - a book. You will see Science Research Associated quite often through our program. But, this particular material is a test where a student must read and answer in 3 minutes. He must read and answer. Before, he had to read quickly, but then when he got to the test part he could sit back and relax and take the time to think and wonder, "well now. Let's see. What was that." But, on this one, he has got to read and answer and they enjoy this challenge. It is a three-minute test. As they go through from level to level (it starts at 8th grade and goes through sophomore in college) of course, the paragraphs and questions get tougher.

"We talked in the beginning about skimming and scanning. We try to remind them constantly that the speed reader is for skimming and scanning particularly. We try to show them how to read a textbook,

not just pick it up and start in on the first word in the chapter. Skim through. What is the main idea? What does the author have to say? Even use questions and summary at the end. But what is his emphasis in the chapter? We keep emphasizing speed reading and skimming are good for picking up a paper in the morning and looking at the front page. You skim through and say, "I guess I will go back and read that article," or you pick up headline topics, italicized words, underlined words, this type of thing. But, we don't want them to think that this is the way they read for study. It is not. When they want to study they have to slow down. If they have done a good job of skimming and previewing, they can do a better job of study reading.

"Some of the vocabulary work deals with prefixes, roots, and suffixes. Some deals with context, with much of it in what they have read. They will take a word that was in the article, and use it in a sentence, as it was in the article. Did the student understand what that word meant in that context?

"We use two books which we think are important for our people. The first one, incidentally they enjoy this as it is quite cleverly done, is Following Directions from California Text Bureau. Again this is something that these students have trouble with. This is one of the reasons that they haven't had much success. They were not able to follow the directions through school. Listen and read tapes are from Educational Developmental Laboratories. There is another good firm out of Huntington, New York. These tapes are well done and in this situation we will have three or four students at a tape recorder, and we have a series of tapes. We can't do all thirty tapes, but we have picked out about ten we think are the most important. There is a workbook with it. They sit three or four to a table, one fellow taking charge of the machine, and they listen to the tape, stop the machine and do the exercises. They will look around to see if everybody is ready, put the tape on again, and get the answers through the headphone sets, learning to listen carefully and follow directions. The tapes are done quite well, and they touch on outlining, note-taking, underlining, SQ3R and so forth.

"The work guide and the work record give them a chance to follow directions and they give the student a chance to organize. This is one of the things that has hampered the success of these people; they haven't been able to organize themselves; they don't know how to budget time for their studies; it is always a last minute thing - if I've got time for it, I'll do it. They have a work guide to follow; they have a work record to keep daily because as they take a test, they take a reading machine pacer, and they record; 275 words per minute is a score of 80. They date it, and the next day they will be doing something else. Some days they will record three scores, according to reading speeds and what materials they use.

"Now one word here about the work guide: As I mentioned at the beginning we try to individualize as much as possible. It usually takes an instructor three weeks or four weeks to read his students.

Then we start to make individual adjustments on the work guide. The work guide starts out as a class project. Everybody gets the same one, just as you got an outline, but once the instructor learns a little about his students he can individualize this work guide. He may recommend more work in vocabulary development. He may find that one student has trouble with this one machine. On the other machines he seems to be making progress but this one machine for some reason or other he doesn't like; for instance, there is one machine that works on the left-to-right movement. The control reader junior works on a left to right movement which is fine at slow speeds but once you get up to 350 or 400 words per minute, that is rather fast. So the instructor, after three or four weeks, can start to make individual adjustments on the work guide and say, "Joe, let's eliminate this one, but I want you to do such and such." Then we give a post-test, make our a profile chart, and they can see on the profile chart, "Here is where I was at the beginning, and here is where I am at the end." They can actually see the results, and we get other comments later about what is going on, and how it has helped them. Here is something they can see at the end of four months and say, "I can see I made some progress," and this they like.

"In DS 60, we use the pretest and the profile chart. Again, here are two more tests. There are many of them. These are just two we came across and we seemed to like, so we use them.

"Number two, materials for mechanics: These are programmed books. You notice again we use 70 per cent. The student reads a unit on subject-verb agreement. We have diagnosed for the test that this is a problem. After the student has written composition or two, we know it is a problem. He has done a unit on subject-verb agreement. He takes a test when he finishes a unit - every material has a test, either publisher made, instructor made, or department made. And, if he can pass the test, fine, he has a pretty good idea of the fundamentals of that specific area. Then he goes on to the next unit. If he can't, we ask him to go back and study. We try as much as possible to sit down and say, "Joe, let's go over the mistakes and see if you understand why you missed so many to score 30 on this test." We say,"Let's go back and take a quick review of that chapter again," and we give him a test again.

"These are the materials we use. There are many more on the market probably just as good. These happen to be the ones that we found and like.

"Spelling is a problem for most of these students. We give a spelling diagnostic test, and from this test we can tell the students the diagnostic test is based on one particular book, that they need to study chapters 2, 5, 6, 9, and 11, for instance. Someone else is studying chapters 4, 5, 8 and 10, and still others are doing different chapters, it depends on how their weaknesses are diagnosed. After they have written compositions, we get down to writing. We will find out that there are certain types of spelling errors, so he works on that particular problem.

"We study the actual writing part in Composition Theory. Again you see Science Research Associates, lab material. It is not programmed; it

is semi-programmed. They study, they answer questions, and they correct them themselves.

"Teaching College writing, strictly expository writing, is very well done and very current. The classes talk about Cassius Clay, Mohammed Ali, topics that they know about and are interested in. Then comes the composition practice and this is really the most important thing. We ask them to write a minimum of ten short compositions. We are not asking for the great American novel. We want them to be able to explain something, to take a stand on some issue, and to present it in some logical orderly procedure.

"In corrections , we do not give them a grade, although a lot of them ask for a grade - is it a B? C? We don't do this because we are afraid maybe they will take this same composition to freshman English a semester later. Maybe a student will write on this same topic and then will say, "Well, Dr. Pollock gave me a B on that composition. How come you gave me a C? Or "Dr. Pollock gave me a C on that composition and you gave me a B. You're easier than he is." English composition is subjective. This is a problem in composition work at college. It depends on how the teacher feels. It's how you read it, how you feel about the subject. Some teachers you know have hangups for, or against certain things. So we stay away from grades, but we make many comments and we try to amplify, especially in the beginning, the good things, because there are some good things. The paper may have many grammatical errors, the sentence structure may be terrible, but maybe the fellow has something to say. They want to say something that is on their minds. They take a stand on an issue so we try to comment on the good. We'll bracket just one phrase they have used well for description. We will underline out in the margin, "good" or "very good." Try to emphasize the good and then also we have to say, "Let's look at this sentence. We have a comma splice. You have run two sentences together here, using a comma instead of a period." Sometimes they have sentences where they just ramble on and have no punctuation.

"So we comment and, as I mentioned, we grade, we comment on logic, organization, what they have to say. This is something that the English teacher in the freshman class cannot do simply because of numbers. The high school teachers can't do it because of numbers - not that they are not professionally competent. They simply don't have enough time, and they have too many students. They are lucky to even get the composition looked at and back to the students, never mind sitting down with them. But, we can sit down with and say, "Let's go over this. This is a pretty good paper. I enjoyed such and such. This introduction was well done but then you got off the subject."

"We are doing this while the rest of the people are working on programmed material, and in this way we have a control. Perhaps a student brings his composition up and here is where you can actually do the instruction. Here is where I say you have got to have teachers who want to do this type of teaching instead of doing as I am doing right now, standing up and speaking for fifty minutes. College teachers

like to talk. I guess it is built into us or something, but this teacher has to sit down at the desk and say, "let's go over your paper. We don't care what these other characters are doing as far as their composition goes. Let's go over your paper. You have to pass the EH 140, not these other fellows." They too keep a work guide which is individualized according to the students needs, after we get to know them in about three or four weeks. The work record is more weekly than daily, because some of the materials will take a couple of days to study and before the student feels ready for the test on that unit. It's evaluated according to reading speed.

"Incidentally, I don't have it listed, but some of you have probably already spotted a point that should be brought up. Counselors have gone along with us here. We try to get the student who is a poor reader into DS 50, the reading study skills course before he comes to DS 60, the composition course. Certainly, because in the composition course there is so much reading to be done in the programmed material, that if he can get the reading background under his belt before he comes to the composition, it is going to make it a little easier. There is another reason. After doing concentrated reading, four days a week, fifty minutes a period for sixteen or seventeen weeks a student has a better feeling of sentence structure.

"As much as possible, if they want to take two courses, we put them in DS 50 and the DS 70 math, together. We used the Lankton Test for math. This was recommended to us, and we have no reason to change it at the present. There are many, I am sure, that would be acceptable. This is the one that we use. It is the same type of idea - reading by units at a certain time within the book and a test. These are publisher tests, or departmental tests, two materials that we have used. The TEMAC series from Encyclopedia Britannica has just come out. We are starting with it this summer, experimenting with it, and we think this will be the one we switch to. We are a little prejudiced because two of our instructors on the Clearwater campus, not our campus, but the Clearwater campus are co-authors of the book after having taught direct studies math for two years. They know a little bit about the problems that we came up with in the TEMAC series. Either one is good. TEMAC is long if you have looked at it. It takes the poor reader a long time to get through it. There is much repetition of exercises. We are just beginning to use a post-test in the math, because the students have enjoyed seeing the pre-test post-test in the other two courses. Now we are going to the post-test in the math. That goes into full operation in August.

"Does this work? I don't see any reason for my reading all the figures in the outline.

"For DS 60, the idea of the whole course is to get the student ready for the English, EH 140, a traditional college transfer freshman English course. It is a tough course. It is known by the students, by the teachers, and, of course, by the state universities. They say, "When you send up a student who has a C or better in EH 140, we don't expect any troubles with learning in this person. Your students have proved that to us."

"The only trouble is, not many students can get through it. We are aimed at one thing: to try to get them to pass the EH 140 that they have to pass. After two years with us 44 per cent of the students in EH 140 made a C or better, which is excellent. We are quite proud of that, because this is a tough course. Even the A and B and C students who come to the college have trouble with EH 140. Another 11 per cent got D's which in some of our two-year programs will be accepted for graduation. They can't transfer it, but for graduation it is fine. Altogether, they have 55 people, who may have been able to get through this freshman English that failed half the people and math that failed the other half. They made it through the English part. In math the percentage is a little lower, but we think we know why this is. The material has been too long. We think this is the main reason. Math and English are the two, I guess in any school, that cause them to flunk out of school. So, we are pleased, but we are not satisfied. We will keep trying to improve. Students come and say, "Look, if I'm going to college, I've got to have help. Help me!" and it works.

"Why does it work? Again I go back to this commitment from the top. This is important. Without our President, pushing it, and without tremendous cooperation from the Dean of Academic Affairs, the Deans of Instruction on both campuses, without that cooperation for class loads, for budgetary purposes, (get the final OK on budget from them) it would be difficult. Their enthusiasm spills over. Admittedly, it takes some time with many of the instructors. As I said many are traditionally oriented and feel if they can't do Harvard level work, flunk them. You have seen that attitude. But, we are winning the instructors over. They are beginning to see that maybe we can help some of these youngsters. You have to have that commitment. Counseling is tremendously important whether you decide to do it individually or whether you are going to turn it over to the college counselors. Once they are sold on the porgram, they can sell it to the students and they have done it. They have shown us that. You have got to have instructors, who want to sit down one to one and work with the students rather than give a class lecture for everybody and having everybody take the test on Friday. You have to have a person who wants to sit down and say, "I can see you don't need this particular work. Let's eliminate that, but let's look at your weakness here, let's work on this." The composition work especially must be individualized. In the future we hope to add two more courses because some of our people come from such a poor background for varius reasons. We want to add social science in which we will touch on some psychology, biological growth, sociology, for the student who has to go into the social science area. You know there are a certain number of hours, nine I think, that he has to pass. Maybe with this survey course behind him as a little background, he can say, "This psychology course was interesting. I want to investigate that a little further." There is much programmed material available, surprisingly not a lot on history, but a lot on psychology, sociology and biological growth. We would like to get into Natural science. The next step is social science as far as we are concerned.

"We have a remedial program at the college because we need it. We don't need it because our high school teachers are so terrible - most of

them are very competent - but simply because our high schools are over-crowded from K - 12, they don't have the money. I don't understand the philosophy of the state legislature that funds colleges rather well, at least in our state, (Florida) compared to the public schools. It is not that teachers can't do it, it is simply that they don't have the money. They have too many students.

"And then secondly, I think even if the legislatures gave the schools all the money that they could use and had it over-flowing that there would be some need simply because some students who in junior and senior high school just don't care. The boys will tell you, that in junior and senior high school, they hated school. They were made to go but they especially disliked things like English and social studies and if they had had all the materials in the world they would not have wanted to work with them anyway. But then around the end of their junior year they start to come alive. They outgrow this period, those of you who have older teenagers know, all of a sudden they say, "I want to do something, I want to get to work here. I want to get a two-year degree or a four-year degree. I want to do this or that," and now they come to us and they are ready to work. So even then the college would have to do something for these people, but I want to end with a plea for high school teachers. Don't condemn them. If you wonder why you have so many remedial students at your school, remember the high school teacher is over-burdened, over-worked and under-paid.

"Now, I will be glad to answer questions."

DESIGNING AND IMPLEMENTING PRE-TECHNICAL MATH PROGRAMS

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For years college staffs have complained that young people were not properly prepared for academic and professional degree study by their secondary school work. Secondary school teachers feel that elementary basic skills have not been properly taught and now lementary people are sure that kindergarten is not well planned. In general, schools criticize parents for improper preschool preparation, part of which is of course true - witness the results of Headstart programs.

The Elementary and Secondary Education Act gave rise to a spate of remedial programs. Educational remedies have become popular - with deemphasis on preventive programs. Great emphasis has for several years been placed on remedial reading and communications. Now the remedial aspects of math and science are permeating the post-secondary levels. I subscribe to the belief that junior colleges, and technical institutes must be community service agencies. But I doubt whether it should be the mission of those institutions to offer basic courses correcting preparatory deficiencies under the guise of college credit.

For example, we have at least one Junior College in Illinois that offers two courses (4 semester hours) of basic reading and study skills; one of pretechnical physics (3 semester hours) one orientation course (1 semester hour) and three pre-technical math courses (11 semester hours). This could consume one full semester of post-secondary time for a student.

The curriculum shown in the syllabus for each of these three sequential math courses is as follows:

GENTK 101. Pre-Technical Mathematics is described in the college catalog. "This course is designed to give the student sufficient background for GENTK 102. Arithmetic operations involving natural numbers, integers, rational numbers, and formulas are stressed."

1. Whole Numbers

   a. Positional notation
   b. Decimal notation
   c. Basic properties

2. Addition and Subtraction of Whole Numbers

   a. Basic combinations
   b. Positional grouping
   c. Traditional algorithms

3. Multiplication and Division of Whole Numbers

   a. Basic combinations
   b. Traditional algorithms
   c. Positional grouping and distributive property for simple mental multiplication

4. Common Fractions

   a. Multiplication
   b. Addition and subtraction
   c. Conversion to decimals

5. Decimal Fractions

   a. Basic operations
   b. Conversion to common fractions

6. Squares and Square Root

   a. Square root algorithms

7. Applied Problems

   a. Percentage
   b. Ratio and proportion
   c. Scientific notation
   d. Linear measure
   e. Area
   f. Volume
   g. Conversion of linear, area, and volume measures
   h. Right triangle problems (Pythagorean Theory)
   i. Numerical trigonometry

GENTK 102. Pre-Technical Mathematics is described as follows: "This is a course in elementary algebra for students who wish to enter a technical curriculum and either did not have a year of high school algebra or who need a review of algebra."

1. Language of algebra

   a. Numerals
   b. Scientific notation
   c. Real numbers
   d. Sets
   e. Variables
   f. Open sentences
   g. Positive and negative numbers
   h. Number lines
   i. Equations
   j. Number theory

2. Properties of numbers

   a. Grouping symbols and uniqueness properties
   b. Commutative, associative, and rearrangement properties
   c. Distributive property
   d. Identity and inverse elements
   e. Addition and subtraction of positive and negative numbers
   f. Properties of opposites and reciprocals
   g. Algebraic expressions
   h. Absolute value
   i. Cancellation laws and properties of zero
   j. Multiplication of positive and negative numbers
   k. Division of positive and negative numbers

3. Equations

   a. Solution set of an equation
   b. Repeating decimal
   c. Formulas
   d. Word problems

4. Inequalities

   a. Less-than and greater-than relations
   b. Properties of inequalities
   c. Solution sets of inequalities
   d. Solving inequalities
   e. The graph of a set of numbers
   f. Intervals

5. Polynomials in one variable

   a. Polynomials in one variable
   b. First law of exponents
   c. Products of polynomials
   d. Products of binomials
   e. Monomial factors
   f. Perfect squares
   g. The difference of two squares
   h. Factoring second-degree polynomials
   i. Division by a monomial
   j. Long-division of polynomials
   k. Polynomial equations

6. Graphs in a plane

   a. Cartesian coordinate system
   b. Linear forms
   c. Linear equations
   d. Graph of a linear equation
   e. Graphs which are horizontal and vertical lines
   f. Simplifying linear equations
   g. Half-planes

7. Polynomials in two variables

   a. Addition and subtraction of polynomials
   b. Multiplication of polynomials
   c. Powers of monomials
   d. Powers of binomials
   e. Factoring

8. Rational algebraic expressions

   a. Reduced expressions
   b. Products of expressions
   c. Quotients of expressions
   d. Addition and subtraction of expressions
   e. Complex fractions
   f. The Fifth Law of Exponents
   g. Equations

9. Systems of linear equations

   a. Solution sets
   b. The graphical method
   c. The substitution method
   d. The addition or substraction method
   e. Word problems
   f. Systems of linear inequalities

10. Functions

   a. Definition of a function
   b. Graph of a function
   c. Direct variation
   d. Inverse variation

11. Roots and radical expressions

   a. Square roots
   b. Other roots
   c. Roots of products
   d. Products of roots
   e. Roots of quotients
   f. Sums of roots

12. Quadratic equations

   a. Solving by fractions
   b. Incomplete quadratic equations
   c. Completing the square
   d. Quadratic formula
   e. Graphs of quadratic functions
   f. Imagery and complex numbers

GENTK 103. Pre-Technical Mathematics. This course carries a prerequisite of course 102 or equivalent and is described as follows: "This is a course in plane geometry for students who wish to enter a technical curriculum and did not take high school geometry. Those pursuing a technical curriculum may concurrently enroll in this course and GENTK 135."

1. Sets

   a. Definitions
   b. Intersections, unions
   c. Venn diagrams

2. Geometric Sets

   a. Angles
   b. Triangles
   c. Geometric symbolism

3. Proofs

   a. Postulational systems for synthetic geometry
   b. Construction of proofs
   c. Deductive and inductive reasoning

4. Logic

   a. Modus ponens or Fundamental Rule of Inference
   b. Converse
   c. Inverse
   d. Contrapositive

5. Congruence

   a. Line segments
   b. Angles
   c. Triangles
   d. Polygons

6. Parallel lines and parallelograms

   a. Parallel postulate
   b. Corresponding angles
   c. Rhombus, rectangles, and square
   d. Transversals

7. Circles

   a. Definition
   b. Central angles and axes
   c. Inscribed angles
   d. Chords
   e. Tangents, secants

8. Similar polygons, proportion and measurement

   a. Ratios
   b. Similarity of triangles
   c. Pythagorean Theorem

9. Geometric constructions

   a. Bisection lines and angles
   b. Perpendiculars and parallels

10. Areas of polygons

   a. Triangles
   b. Quadrilaterals
   c. Circles

My son, a sophomore in high school, tells me he has an understanding of the processes covered by all three of these courses having had junior high arithmetic and high school algebra and geometry.

A following course GENTK 135 carries five semester hours of credit. It is described in the catalog thus: "Topics taught in this course include trigonometric functions, systems of linear equations in two or three variables, second and third order determinants, two dimensional vectors, logarithmic and exponential equations, complex numbers, translations of conic selections, and slide rule operations." This entire series of courses has a reasonable similarity to the Technical Mathematics course organized by Parkland College at Champaign, Illinois and offered last year in two feeder high schools of the area. Thus with either a 16 semester hour remedial sequence of courses or with a one-year specially designed preparatory course, the student is able to enter a technical program with an adequate math background.

Math teachers from Rantoul High School were concerned with the inadequacy of their program. In October, 1967 they visited Parkland College and presented an original concept of the high school's role in preparing students for post-high school technical education. In the light of the brief experience of Parkland College and the experience of other two-year colleges, the concept goes right to the heart of one of the major problems of two-year college technician programs. The technical student must have a reasonable understanding of and facility in basic mathematical operations to attain a successful educational experience in the two-year college.

Articulation between the high school and four-year colleges, as well as two-year college transfer programs has been well developed. However, very little is being done to articulate secondary programs with two-year college technical programs.

In November, 1967, Mr. Paul Thompson of Parkland College submitted a proposal to the Illinois Research Coordinating Unit which states, "Students entering technical programs do not have an understanding of and facility in mathematical operations at a very basic level. A possible solution to this problem is a course called Technical Mathematics offered at the secondary level*"

Technical Mathematics was designed by Rantoul High School and Parkland College to be a structured essential mathematics program for those students who do not aspire to a four-year academic college education. It provides the necessary repetition of mathematical skills and those additional skills needed by students entering post-secondary technical programs or immediate employment situations.

This program provides an opportunity on the secondary level for the pre-tech student to improve and apply his mathematical skills in various technical areas. It will speed and increase his opportunities in either post-secondary education or employment.

The proposal was reviewed by our RCU staff and a review committee. Gerald Gladden, State Supervisor of Technical Education reacted as follows,

(a) "One of the factors which contribute to the problem of limited enrollments in post-secondary technical programs is the inadequate academic preparation of potential students ... of those subject matter competencies required of the prospective technical student, the most vital and the most universal in application is the subject of mathematics."

(b) "Two solutions to this problem are readily apparent. One of these, the more immediate (and temporary) solution is to require that the student deficient in preparation enroll in and satisfactorily complete selected remedial courses prior to admittance to or concurrent with enrollment in the first term of a technical program. A much more satisfactory and permanent solution to the problem is to make available to the secondary student and to counsel him to enroll in preparatory and / or remedial courses in mathematics and other subjects while the student is still in the secondary school. The traditional sequencing and structuring of mathematics courses in the secondary schools will not serve to ameliorate this problem. Courses which

*Emphasis added

treat of the practical utility of mathematics as a tool and which may be abbreviated by virtue of the exclusion of many theoretical constructs must be developed and instituted in the secondary schools."

At this point, an unusual happening occurred. An original budget had been submitted by Mr. Thompson for $7,000 to develop and field test this curriculum in 1968. Our staff massaged and adjusted the budget and arrived at a justifiable figure of $10,191 and the understanding that the program would be tested in at least two secondary schools. On April 17, 1968 a final proposal was received from Parkland and on May 15, a contract was signed for the 1968-69 Fiscal year.

The rationale for this project started from the postulate that "the average student enters high school with a relatively undefined career goal. Based on a variety of factors, he is placed in Algebra I or Practical Mathematics as a freshman. He may have an indifferent or unsuccessful experience in one or both of these courses and (if so he) does not elect to take additional mathematics courses. By the time he is a junior or senior, he is approaching a career decision. A baccalaureate degree seems unattainable and the two-year college may become a possibility; and after graduation, he enrolls in a technical program in a two-year college. It has been three years since he completed a mathematics course."

Such a student can be expected to immediately have an unsuccessful technical education experience because of his past history of mathematics. Rather, as the average student approaches his senior year, high school counselors should be able to identify potential two-year college technical program enrollees. Students so identified can then be encouraged to enroll in a technical math course in the senior year (or the junior year if early identification is accomplished.)

The project rationale continued, "An appropriate technical mathematics course may be the most significant step we can take to provide those skills which will enhance the students' opportunity for a successful collegiate experience. The general objectives of this technical math program are:

1. Offer a structured essential mathematics program for those students who do not aspire to a four-year academic college education.

2. Provide necessary repetition of mathematical skills for those high school courses in which mathematics is necessary.

3. Provide the necessary additional skills for those students going into post-secondary educational programs or immediate employment situations.

4. Have students develop confidence in doing routine mathematical computation.

5. Have students organize their work into consistent patterns.

6. Have students develop a sense of values toward all occupations and recognize excellence in all fields.

7. Improve the guidance possibilities for the non-academic college bound and the non-college bound students.

8. Develop improved motivation* for those students going into post-secondary educational programs or immediate employment situations."

Materials for this technical mathematics program were developed cooperatively by teachers from the two high schools and the junior college. The emphasis of the course is on application not theory. The topics selected for presentation were chosen with this in mind. The selection of topics is commendable and is perhaps one of the more unique aspects of the program. To my knowledge, there is no mathematics textbook available with similar content for either the secondary or junior college level.

The course content is broken down into 17 major topics. The first four cover necessary repetition of basic arithmetic skills. These chapters are set up for programmed instruction. The material is keyed with answers provided. The student moves at his own rate through the material and receives continuous feedback as to his progress. Through self-evaluation, the student decides when he is ready to move on to Chapter 5. The more capable student may need to spend only a day or two on the first four chapters, while the "mathematically disadvantaged" can spend as much time as necessary to master these basic skills. The comprehensive nature of this course is shown by this outline of its contents.

1. Operations with Integers

    a. place value
    b. divisibility tests
    c. signed numbers
    d. formulas

2. Operations with Common Fractions

    a. simplifying
    b. addition, subtraction, multiplication, division
    c. operations with rulers
    d. formulas and technical drawings

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*Emphasis added

3. Operations with Decimal Fractions

   a. place value
   b. addition, subtraction, multiplication, division
   c. scientific notation
   d. powers of 10
   e. rounding

4. Percent and Review

5. Binary Numbers

   a. analogy between base 10 and base 2
   b. simple computer analogy, flow charting
   c. addition, subtraction, multiplication,
   d. conversion from decimals to base 2

6. Measurement

   a. conversion - metric - English
   b. approximation, greatest possible error, precision, tolerance
   c. mean measurement, mean deviation, relative error, percent of error
   d. addition, subtraction, multiplication, division
   e. accuracy
   f. area and volume in metric units

7. Measuring Instruments

   a. vernier caliper, English and metric
   b. micrometer, English and metric
   c. reading scales - uniform and non-uniform

8. Logarithms and Tables

   a. reading tables
   b. multiplication, division, roots and powers with logs

9. Slide Rule

   a. multiplication, reciprocals, division, squares, square roots, cubes, cube roots, and combinations of all these processes.

10. Ratio and proportion

   a. study of maps, scale drawings
   b. formulas for levers, pulleys and gears

11. Geometry and formulas

    a. simple geometric figures and formulas
    b. algebraic properties
    c. indicated operations

12. Linear Equations, simplifying expressions

    a. develop idea of equations
    b. formulas, solving equations
    c. graphing linear equations
    d. solving 2 equations in 2 unknowns

13. Graphical Analysis

    a. How to read and construct circle graphs, line graphs and bar graphs
    b. information related to technical jobs relayed through problem solving

14. Polynomials

    a. addition, subtraction, multiplication, division

15. Factoring quadratic equations and drawing graphs of parabolas

16. Descriptive geometry

17. Right triangle trigonometry

    a. slide rule
    b. simple trigonometric functions

The emphasis is always on application. The materials are written for individualized instruction with the teacher as a resource person. Within each chapter there are check points where the student takes a self-test to measure his progress. If he is ready, he moves on. If he has some difficulty and needs more work, several options are available:

1. he can recycle back to earlier chapters;

2. he can get supplemental material such as work sheets or a reference test presenting the material in a different light;

3. he may seek additional help from the instructor;

or

4. he may work with a student tutor, i.e. someone in the class who has successfully completed that material.

The original course materials included only the first 15 chapters. However, at both Rantoul and Centennial (Champaign) High Schools, it was

discovered that some of the able students covered the material in less time than expected. The chapters on descriptive geometry and trigonometry were added to provide a higher level of sophistication for the more capable technical mathematics student. These students were also encouraged to work as tutors with the slower students in the class.

A key factor in developing a successful program is the imagination instructors can use in assisting students to want to learn relevant concepts and skills. Important methodological factors are:

1. The course is taught by a spiral approach with recycling back to previously covered materials.

2. The problem solving method stresses application and basic skill development rather than theory.

3. The course provides for individual differences. The materials are designed to be used for individualized instruction with each student progressing at his own rate.

4. There is an attempt to utilize aids and kinesthetic sense (learning through the use of hands) as much as possible. For example, in the section on measurements, students actually practice with their own micrometers and vernier calipers.

One of the high schools employed team teaching while the other stuck to more traditional methods. Both programs were successful. They do not feel there is any one strict teaching technique which must be followed to make the course effective.

From a beginning of two high schools cooperating with a junior college the program is now expanding to 17 high schools in Illinois. It is expected that over 500 students will participate in this technical mathematics course during the coming school year. Therefore, starting in the fall of 1969, monthly teacher workshops are being planned to increase communication between all those involved in the program. Teaching techniques and hardware will also be improved and developed through these workshops.

The materials for the program are continously being rewritten. The first draft of the instructional materials had both mathematical and pedagogical errors. However, the material has been reviewed, evaluated and revised by the experimental team which includes a mathematician. Teachers are encouraged to comment on the course and offer suggestions pertaining to content, method of presentation and teaching techniques. As an example of evaluation, Edwin Fitzgibbon, Chief of Technical Education in Illinois, reviewed the "text" material during the course of the project giving some selected suggestions as follows,

(a) "The reading ability of the majority of students in this course will be at approximately the same level as their mathematical ability, below average. If this reasonable

assumption is true, the language level of the text is decidedly above the reading ability of the majority of students..."

In answer to this criticism, the project staff points out that the revised materials have been randomly checked to determine the reading level of the context. The Dale-Chill method of assessment shows the reading difficulty to be between the 7th and 8th grade level. Therefore, the language of the text should be within the reading ability of these students.

(b) "... logarithms are taught without once mentioning that they are exponents and the slide rule is taught without mentioning that its scales are log vectors (or something corresponding to this but in simpler language."

and

(c) "... the selection of topics for presentation is commendable and some of the more novel approaches to presentation seem to have considerable merit. An example of the former is the inclusion of standard notation and measurement, and an example of the latter is the "programmer" approach to logarithm manipulation."

This technical mathematics program in not a watered down course or a "mickey mouse." The course content has been greatly altered from the traditional program with emphasis on application, and deemphasis of theory. The course is taught with rigor.

Students enrolled in the program must show some mathematical ability. The majority of the selectees were above average in General Math. Some below average students who had completed Algebra I were accepted.

Counselors try to identify non-baccalaureate oriented students with an interest in employment or further technical program enrollment. These students are then counseled into the technical mathematics course. If they successfully complete the course and enter Parkland College, they are exempted from MATH 121, (4 quarter hours) APPLIED MATHEMATICS, which is the first of a required two course series for technical programs.

Students in this experiment reacted very favorably toward the course. They were able to ask the question "How is this going to help me?" and get an answer related to further educational and employment opportunities.

Because of the method of presentation of the materials many students were able to experience successful mathematical achievement for the first time. When students move at their own speed, each step forward follows the successful completion of the previous material. Psychological studies have shown that success in an endeavor very often leads to increased motivation. For these students an increase in motivation can drastically change their college experiences.

Paul Thompson, Director of the project, did a study on academic performance of the students enrolled in the Tech Math program.

Forty-three students from Algebra II or trigonometry and 54 students from Tech Math were randomly selected. He compared the grade received by these students with their grades in the last prior mathematics course in which they were enrolled.

Looking at the histograms of the grades received over this period, we can see that the grades for Tech Math students increased. The mean grade for these students in Algebra I was 2.74 while the mean grade in Tech Math was 3.38. When tested for statistical significance, the difference is significant at the .01 level. On the other hand, the grades received by the students in Algebra II or trigonometry actually went down from a mean of 4.12 to 3.88 although the decline is not statistically significant. The technical mathematics students are at least experiencing increased academic success in mathematics. In the process, they have developed confidence in their ability and increased pride in their work. There will also be a two year follow-up study of the students enrolled in the study to determine the effects of the program, as these students move through the two-year college or into actual employment situations.

Besides success motivation, there are other benefits from operating a technical mathematics program on the secondary level. A student receives full credit for a technical math course at the secondary level. The junior college also receives greater numbers of capable and qualified students into their programs. It is hoped that the students who have completed this course will have an understanding of and facility in mathematical operations at a basic level. The two-year college will be able to cut down on "bonehead" and remedial course and maintain the levels of prestige and rigor that they would like.

This course would also alleviate the problem of retention of mathematical skills. Normally a student with an unsuccessful experience in Algebra I will take no further mathematics at the secondary level. By the time he enters any post-secondary program, the several year interval since he has had any math contributes to the likelihood that he has forgotten many (if not all) of the concepts and processes he had learned. Since the Tech Math course is offered at the 11th or 12th grade level, the student may proceed into a technical program with very little time lag. This same student, because of his background and increased capabilities is more readily recruitable for post-secondary technical programs.

In a similar manner, a cooperative program was established by the Illinois RCU with College of DuPage (a 2 year institution) and Willowbrook High School to provide a Computerized Vocational Information System (CVIS).

Development of Project CVIS began in January, 1967, at Willowbrook High School. Members of the Guidance staff designed the system, and 75% of project costs have been supported by the Research Coordinating Unit of Illinois State Board of Vocational Education and Rehabilitation. In Spring, 1968, Willowbrook formed a joint agreement with College of DuPage for the operational phase of the project. Computer equipment was installed in October, 1968, and the project as described is currently in operation.

I want to tell you a little about this because it is another excellent example of an articulated program between secondary schools and a junior college.

The computer is used to store information about approximately 400 occupations. These are classified by Anne Roe's system (The Psychology of Careers, New York, 1956). Occupations are divided into six levels of training and responsibility and eight areas of interest, thus forming forty-eight "boxes" or grouping of occupations. The computer system also stores pertinent information records of Willowbrook students. This record includes personal data, courses, grades, test information, health information, extra-curricular activity involvement, record of referrals, and personality ratings.

The student has access to the computer's information by means of terminals, which consist of an IBM 1053 typewriter and an IBM 2260 cathode ray tube (TV screen). The student receives information which he may want to keep in hard copy from the typewriter, while "conversation" takes place on the cathode ray tube. A script has been developed which leads the student through a limited self-analysis.

Once the student has reached a decision about future education and area of interest, he is presented a list of suggested occupations. The student may reject the list and ask for another, or he may explore the occupations on it. He can only do the former by changing educational plans and / or area of interest.

In more explicit terms, CVIS provides the student with a machine which has two data bases. One contains facts about occupations; the other stores objective data about the student. The student is given the capability to bring the one to bear upon the other, to explore to the limit of 400 occupations, (the number is being constantly expanded) to formulate tentative choices, and to find out where to explore at greater depth.

Plans for further development of the system now include writing scripts to build additional data files. One which is more pertinent to our discussion here will give students access to information about local community colleges. Students can receive general information about these schools as well as detailed information about technical and specialized schools within a 100-mile radius. The student may have computer assisted instruction on how to choose a school for specialized training, kind of certificates offered in these schools, and kind of programs available.

He may also receive a list of schools which offer training for a particular job and receive specific information about each of the schools on the list.

The coordination of such programs as these just described has resulted in further discussion of "2 + 2" institutions and curricula in Illinois. This would mandate a close relationship between the 11th, 12th, 13th and 14th grade levels. Technical and vocational programs

would be welded more closely. Regular funding of courses would become matter-of-fact rather than a constant effort to determine categorization into prevocational, vocational, pretechnical, preprofessional, or professional for funding purposes.

For programs which have not been regularized, the exemplary projects and programs section of PL 88-210 offers a means of funding many activities of this sort. In cases where technical institutes, junior colleges and secondary schools are not willing to concede that the wheels I have described are round, further research and experimentation may be justified to modify this model. Certainly we believe that in the very short term field testing of Tech Math by Parkland College, it deserves replication, demonstration, and dissemination.

We have experimented, field tested, and to some degree now are disseminating the idea. Why don't you plan to replicate, test, and demonstrate the idea further? This is a design that you can implement as a part of your total program for technical education.

PRE-TECHNICAL, POST-SECONDARY REMEDIAL READING AND MATHEMATICS PROGRAMS

James Connally Technical Institute

Dr. Clodus R. Smith
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I am pleased to have this opportunity to come again to the James Connally Institute. This is my third visit to the campus. The first was both of social and professional nature to visit with the Director of the Institute and to see first-hand the facilities of the Institute and to learn of Mr. Dugger's optimistic plans for the development of technical training in 40 occupations. As I recall, the charge given by the Governor was to provide training in those emerging occupations for which training programs were yet to be devised. My second visit to the campus was for the dedication of the Institute by the Governor of Texas, members of Congress, and other dignitaries from Washington. So, it is a special privilege for me to be back to the James Connally Technical Institute, an institute in which I have considerable interest.

I should like to congratulate Dr. Tompkins and his able assistant, Mary Belcher, for the development of an outstanding institute, and for the development of leaders in the field of technical education. Experience gained in several National Leadership Development Seminars has convinced me that many of our problems in vocational and technical education are directly related to our own lack of understanding of the complexity of our profession and a lack of appreciation for the attitude, abilities, and potential contributions of governmental agencies, disciplines, and forces which bear upon vocational and technical education programs. Too, I have come to appreciate the challenges and responsibilities associated with the planning, development, and execution of a training program such as this one. To conduct this program has taken an uncommon amount of enthusiasm, energy, and skill on the part of Dr. Tompkins, Mrs. Belcher, and Mr. Gentry.

To examine the courses of study in reading and mathematics which support pre-technical and technical training programs, this discussion has been organized into three major areas. The first is to review the role of technical institutes and junior colleges in terms of opportunities to provide post-secondary remedial programs; secondly, to discuss a concept of curriculum which places reading and mathematics in a role supportive to technical skills; and thirdly, to share with you

some of my beliefs on leadership development needs in technical education.

ROLE OF TECHNICAL INSTITUTES IN PROVIDING POST-SECONDARY REMEDIAL PROGRAMS

Our advancing technology demands more skilled craftsmen and highly skilled technicians in occupations requiring scientific knowledge. It is of national concern that vocational and technical education prepare many more technicians and skilled craftsmen for employment in industry, business, agriculture, and the health fields. These demands have brought about changes in programs and the allocation of resources.

At no other time in the history of American education has vocational education had more opportunities to serve the public interests and needs, and greater challenges to the charting and delineation of its destiny. Never before has the social and educational climate been so favorable to the development of occupational training programs. Perhaps it is important to note that, although historically based there, more than half of our occupational training is offered outside of the public school system including the community college and technical institutes. To put it another way, there is more occupational training offered outside of the auspices of the Office of Education than within those programs funded by it. Vocational education leaders cannot recall when so many agencies of government, business, and non-profit organizations had so much interest in training programs.

This new interest by the public, business, and industrial and governmental sectors brought about by new monies for public school programs, an array of manpower training programs offered by units and subunits of the Department of Labor, Department of Defense, and the Bureaus in Welfare has been accompanied by unequaled program dynamics in this once lackadaisical field of education. Where there is new money for programs, there also are opportunities, responsibilities, challenges, aspirations, changes, and disappointments.

Pre-Technical Education

The next decade will see pre-technical and pre-vocational training through the public school system. In actuality, much of what has been offered in existing programs must be objectively viewed as pre-vocational and pre-technical. I recognize that this comment is unpopular among my vocational education colleagues, but none the less it is true. Employers of the products of the public schools are quick to indicate that few graduates are ready for employment as technicians or in occupations needed by industry. Most large-scale employers

must offer on-the-job training, pre-employment, and other training programs to mold the type of employee needed for specific jobs. The more complex the skill needed, the more this is likely to be true.

Only in the last five years has the Office of Education supported the view that pre-vocational education is a proper concern of the Division of Vocational and Technical Education. In the future you will hear much more about the acceptability of the expenditure of public funds for this purpose. The question then will be at what time or place within the system should pre-vocational offerings be provided. The current thought is that the junior high school is an appropriate time and place for pre-preparation for occupational development. The purpose of the program would be to create favorable attitudes toward work, to gain some understanding about the diversity of job and skill opportunities, and to identify the aptitudes of the future employee. Because of the current lack of acceptance of this concept, little research has been conducted to shape the nature of the curriculum which will be needed to provide pre-preparation programs.

Area vocational schools, technical institutes, and community colleges have seemingly had the proper environment to cope with the diversity of emerging occupational training programs which require technical skills. It is in these institutes that the largest number of our educationally deficient youth will find their highest educational challenge and development. A large portion of the students who need to experience remedial programs will not have received a strong secondary education but, rather, will only become available for training when age releases them from school. We should recognize from the outset that while on the one hand we have a need for technicians, on the other hand we have educationally deficient youth representing a social problem resulting from a majority who cannot find work owing to the lack of saleable skills. When appropriately trained, these same persons could fill this nation's void and thereby their status would be changed from a liability to our society to an asset of the national economy.

It seems to me that this is the intent of pre-technical programs for persons at the post-secondary level who have educational and employment skill limitations.

Pre-technical, post-secondary remedial courses are not universally accepted by the profession. The open-door policy of the community and junior colleges and some technical institutes implies acceptance of the concept of universal higher education. In accepting this ideal, these institutions express a commitment to providing education for all high school graduates and others who can profit from the instruction.

One of the most pressing problems today centers around the student who for various reasons cannot meet the minimal performance levels demanded by the academic environment of the institutions. To correct this situation, administrators have turned to post-secondary remedial courses; and now there have arisen much controversy, confusion, and disagreement over the effectiveness of the courses, their future potential, and the basic problem of whether or not they actually serve a meaningful function.

Such courses, established first by the community colleges to deal with low-achieving students, are called remedial, developmental, guided studies, or one of a score of less common terms. Most of these programs have as their central purpose the remediation of students to the point that they can enter credit-bearing courses. Administrators and researchers can offer little research regarding the success or failure of students who are forced to enroll in these programs. Community colleges have, therefore, tended to carry on in a trial-and-error fashion, hoping to find some sort of answer.

POST-SECONDARY REMEDIAL PROGRAMS IN READING AND MATHEMATICS

Most leaders involved generalize that remedial programs are developed to remedy student deficiencies, to provide a second chance for salvaging human resources. Others feel that the community college remedial programs are custodial in nature, that community colleges provide for low-achieving students in order to keep our young people out of the labor market, off the streets, or out of trouble. Other writers insist that the community college cannot be a quality educational institution and at the same time a custodial institution. However, it appears that there is little agreement on objectives. Research is needed to evaluate the objectives of current programs and to point the way for more effective effort in the future.

To provide a frame of reference for our discussion, perhaps we should quickly review some of the more notable characteristics of the students to be served. In part because there is need for caution, if not alarm, mention will be made of the typical remedial course instructor's competencies. Also, examples of study courses in remedial reading and mathematics will be shared, materials and equipment demonstrated.

Characteristics of Students Needing Remedial Courses

Low-achieving students in institutions offering post-secondary remedial programs characteristically suffer from one or more of the following:

1. Graduated from high school either a low "C" average or below.
2. Are severely deficient in the basic skills, such as languages and mathematics.
3. Have poor habits of study, and probably a poor place to study at home.
4. Are weakly motivated and lack home encouragement to continue.
5. Have unrealistic and ill-defined goals.
6. Represent homes with minimal cultural advantages and minimum standards of living.
7. Are the first of their family to attend college and thereby, have a minimum understanding of why or what opportunities it may offer.

Low-achieving students can be identified by the School and College Ability Test (SCAT), by the American Council on Education Test (ACE), and the American College Test (ACT). Other community colleges use a variety of tests including the Scholastic Aptitudes Test (SAT), and the College Qualification Test (CQT). Various state-administered placement tests are used in Florida, New York, and Washington. Low-achieving students are typically identified as scoring below a given percentile on one of these tests; usually the percentile is the 11th to 15th range.

A recent cooperative research monograph lists significant characteristics of remedial students in a general math course as follows:

1. A dislike for and lack of confidence in handling mathematics.
2. An approach to testing characterized by non-flexible organization.
3. Emotional disturbances associated with awareness of personal inadequacy.
4. Lack of self-confidence in their relations with instructors.
5. A prevelant prediction of unfavorable outcomes for self and peers in a school situation.

Competencies of Instructors of Remedial Courses

The preparation and abilities of instructors of remedial courses may be a limiting factor to some pre-technical training programs.

According to Beacon, a report released by the American Vocational Education Research Association, most members of a department in which remedial programs are offered are involved in at least one remedial course. Instructors are typically

assigned a remedial course as part of their regular teaching load. It appears that tenured instructors get first choice to teach advanced or specialized courses while instructors with less experience and tenure are assigned to teach the classes that are left, the remedial courses. Extensive research bears out the fact that the inexperienced instructor is the one most often found in the remedial classroom.

Therefore, it follows that instructors in the remedial programs typically have not been adequately prepared for the courses that they are required to teach. The instructors in these programs agree that they are learning about remedial students through an on-the-job process. Such instructors are also concerned about the larger universities and about being properly identified as "being in higher education." To them, when they teach a remedial or development course, they are not identified with higher education, whereas, their university contemporaries are teaching specialized, advanced courses which afford them much personal and professional prestige.

Data from some studies also show that instructors in remedial courses frequently do not indicate any knowledgeable understanding of the basic objectives of the course.

At Los Angeles City College, which has conducted an evaluation of its remedial programs for many years, administrators feel: (1) That programs must be developed for in-service training of instructors in their teaching and counseling of low-achieving students; (2) That group sessions of faculty members must be instituted to discuss and design means to handle common problems in remedial programs; such group sessions would permit discussion of feelings and attitudes about students, feelings and attitudes about their own aspirations and roles, developing new teaching procedures, and making recommendations and evaluations; (3) That seminars, symposiums, and workshops should be routinely organized to treat problems of teaching remedial students.

A special workshop has identified the following qualifications needed by instructors in remedial programs: (1) The instructors must seek change in the present curriculum or ignore it; (2) The instructor must understand his teaching field and be able to present the materials at the level of the students; (3) The instructor must be willing to live with the knowledge that many people believe such students have no place in college; (4) The instructor must give up his beliefs that to be non-verbal is to be a non-learner; (5) The instructor must believe in the educational worth of the remedial student; (6) The instructor must be willing to give up the student in relevant educational experiences which stress the processes in which learning takes place.

Remedial Reading Programs

One of the difficulties associated with remedial reading programs is the wide range of abilities of students. A program must provide for functional illiteracy, comprehension, speed, and specific reading and visual problems. A recent survey of remedial course offerings in 35 California community colleges indicated that more remedial courses were offered in English than in any other single subject area. In addition, colleges see a need for training in basic reading ability. The emphasis of remedial reading courses was placed on improving reading habits, word recognition, eye span, speed of comprehension, retention, and phonics.

Several schools reported courses which provide the low-achiever with some sequence of the life experiences that will hopefully enable him to live a more productive life as a citizen. Twenty-four of the colleges surveyed offered remedial mathematics, all offered some course in social science, including history, sociology, and political science.

At some junior colleges a total program for the low-achiever has been developed. Contra Costa Junior College, California, has adopted a revolutionary approach. Philosophically, the program assumes that the low-achiever enters college with social and economic educational handicaps which do no reflect his potential. Therefore, the program seeks to develop tutoring as a major means of correcting the problems of remedial students. The tutoring program is conducted as a discovery function toward the revelation of strong and valuable resources in a student that have been heretofore submerged.

At Los Angeles City College, a "Block" program has been organized in which the offerings of several courses are merged into an integrated experience. For instance, while the English class was reading Red Badge of Courage, the psychology instructor encouraged a study of the motives displayed by the characters in the book, or developed role playing in similar situations; and the speech instructor encouraged debates on the same topics.

One of the examples of material at the lower levels for your review in the specially prepared packets is an OEO supported study by the Greenleigh Associates, Incorporated. Some of the interesting findings of this review of the better known reading programs were: (a) that the attainment of trainees was not related to the cost of the programs; (b) contrary to a later premise which I shall support, high school graduates with a high interest in literacy training who received short term teacher-training courses exceed graduates

as teachers and (c) that differences in programs were related more directly to their management than to their content.

A unique approach to the stimulation of reading by limited readers resulted in a collection of classics and well-known books. These books have been re-written from their original length of perhaps 300 pages to 60-75 pages in a 6-8th grade vocabulary. Although these examples may be at a level too low for many of your students, the concepts involved may have merit.

Examples of the reading program and the books designed for use at the lower levels are available for demonstration and study by your small word groups. Your reactions to both items will be appreciated.

The optimum size of classes for pre-technical programs communication skills, mathematics, and science is 25. To provide for close supervision, individualized study and instruction, and daily evaluation basic study skills classes should not exceed 16 students.

The space and facilities required for each course may be the same as for the regular technical courses. Courses in chemistry, biology, and physics for pre-technical programs are essentially the same as those found in comparable programs.

Two areas warrant special consideration: the library and the study skills laboratory. A library which supports pre-technical training programs should be considered essential to an adequate reading program. It should contain selected literature and materials related to all pre-technical courses. Materials should include: (1) language and communications teaching materials which emphasize grammar, speaking, spelling, elementary composition, reading, comprehension, and vocabulary development; (2) materials for mathematics, starting with arithmetic and proceeding to the college level mathematics required for regular courses in any technology; (3) science materials, including physics, chemistry, and biology at the upper high school level as required for pre-technical courses; and finally, (4) special materials for basic study skills.

A special laboratory for teaching basic study skills is a unique facility required for pre-technical programs. The basic study skills laboratory is provided primarily for intensive remedial reading study and is a facility of singular importance to successful pre-technical, post-high school programs. Commended for your review is the study skills laboratory described on pages 30-34 in Pre-Technical, Post-High School Programs which was distributed by Dr. Walter Brookings. I have also included a copy of this material in the booklets prepared for the eight study groups.

Remedial Mathematics Programs

Student development requires that we start at the point in educational preparation which each individual has attained and provide for the missing knowledge, understanding, and appreciation prerequisite to the successful mastery of the occupational program to which the student aspires. These programs must be so constructed as to repair the academic deficiencies on an individual basis.

The current curriculum organization concept is to have a high degree of relation between the technical courses and the basic courses wherein the mathematics and science taught is articulated with the technical subject matter studied. Underlying each technical course and its related student activities, are the basic science and mathematics needed to support the desired learnings in the emerging technologies which are increasingly sophisticated. An example would be the mathematics and chemistry which undergirds the very fast growing technologies in medicine and food processing. The requirement for organized scientific knowledge and the mathematics which support it for entry into many of the post-high school occupational programs is comparable to that required for entering baccalaureate programs.

Many students, for various reasons, do not prepare themselves while in high school by studying more than a minimum of science and mathematics. Administrators of integrated curricula state that when students have had the benefit of programs which remove their academic deficiencies as a part of their occupational study programs, the morale of students and instructors both are improved, the number of students who drop out because of academic failure is reduced, the total cost is reduced because of better resource usage and fewer failures, and better qualified graduates are produced.

Example courses of study in mathematics are included in the booklet provided for study groups.

LEADERSHIP DEVELOPMENT

I am informed that one of the purposes of this Institute is to stimulate the creation and expansion of pre-technical programs. To achieve this goal will require the best talents within the profession to assure the knowledge and abilities needed at the local, state, and national levels. We should have an aggressive leadership program.

Time does not permit me to speak fully on this topic in which I have been quite involved. However, let me leave you with some feelings which have resulted from the more than

one dozen National Leadership Development Seminars.

The technical areas of our work are among the ones which are experiencing the greatest expansion. The work technicians are doing is becoming more complex and more sophisticated. At the same time, the role of technicians is becoming accepted in more occupational fields each year. Our projections for technicians training is probably lower than our actual needs.

A second dimension is the relationship between teachers and students. My responsibility at the University of Maryland convinces me that supervisors and administrators are planners of academic environments and state centers which are necessary to learning, but the total arrangement is insufficient until there is an appropriate relationship between adequately prepared teachers and motivated learners. In its program Development Budget Series No. 1, the Office of Education has projected occupational needs by field and of activity. It clearly indicates an expected increase in post-secondary workers and their technical training. Also it indicated an expansion of state departments of education to administer and supervise these and other programs. Even so, let me challenge you with the idea that in no area other than technical education is there a need for more new leaders. Perhaps more important is the fact that our technical education programs must be improved through institutes such as this one. The evidence seems clear that more of the same quality of effort will not suffice for tomorrow's program needs. If these statements aren't correct, then you should feel both gratified and humble for your superiors, the Office of Education, and the director of this institute has placed a unique responsibility upon your shoulders for the future of pre-technical education programs. I hope each of you will fulfill the responsibility of becoming a trainer of trainers and conduct state-wide seminars in your respective states. Only with a multiplier effect may the profession generate the leaders in sufficient numbers to fulfill its destiny.

APPENDIX B

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APPENDIX C

JAMES CONNALLY TECHNICAL INSTITUTE
WACO TEXAS 76705

OFFICE OF THE DIRECTOR
(817)-799-6221

July 14, 1969

Participants of
Pretechnical Post-Secondary Remedial
Program Training Institute

Welcome to the campus of the James Connally Technical Institute. It is indeed a pleasure to have you as our guests to participate in the Pretechnical Post-Secondary Remedial Program Training Institute.

It is the desire of the faculty and staff at Connally Tech that your participation in this Institute will be both profitable and enjoyable.

Please feel free to call on the members of our staff or faculty if we can be of service to you.

Sincerely,

Roy W. Dugger
Director

RWD/bb

MONDAY, JULY 14

Dr. Jack E. Tompkins
Presiding Officer

8:00 a.m.	Institute Office Opens
9:00 a.m.	*Call to Order and Welcome* Dr. Jack E. Tompkins Associate Dean for Research & Development James Connally Technical Institute
9:15 a.m.	*Orientation to Institute Procedures* Mrs. Mary H. Belcher Institute Coordinator
9:30 a.m.	"AN OVERVIEW OF STUDENT DEVELOPMENT PROGRAMS" Dr. Walter J. Brooking U. S. Office of Education Washington, D. C.
10:30 a.m.	Coffee Break
11:00 a.m.	Response and Group Discussions Dr. Tompkins Dr. Brooking
12:00 noon	Lunch
1:30 p.m.	Workshop Groups (see Workshop Objectives)
3:00 p.m.	Coffee Break
3:30 p.m.	Workshop Critique & Discussions Dr. Walter Brooking
5:00 p.m.	Adjournment

TUESDAY, JULY 15

Mr. Bill Ross
Presiding Officer

8:00 a.m.	Institute Office Opens
8:30 a.m	"THE NEED FOR TECHNICIANS AND UTILIZATION OF PRETECHNICAL PROGRAMS AS A RECRUITMENT DEVICE" Professor George S. Whitney Chairman, Engineering Technologies State University of New York Alfred, New York
10:00 a.m.	Coffee Break
10:30 a.m.	Response and Group Discussions Mr. Ross Professor Whitney
12:00 noon	Lunch
1:30 p.m.	Reassemble for Visits to Reading and Mathematics Laboratories at JCTI
3:30 p.m.	Coffee Break
4:00 p.m.	Group Discussions Mr. Ross
5:00 p.m.	Adjournment

WEDNESDAY, JULY 16

Mr. Arthur Young
Presiding Officer

8:00 a.m.	Institute Office Opens
8:30 a.m.	"EXPERIENCE WITH DIRECTED STUDIES IN READING, COMMUNICATIONS AND MATHEMATICS" Dr. Arthur Pollock Chairman, Directed Studies St. Petersburg Jr. College St. Petersburg, Florida
10:00 a.m.	Response and Discussions Mr. Young Dr. Pollock
12:00 noon	Lunch
1:30 p.m.	Workshop Groups
3:00 p.m.	Coffee Break
3:30 p.m.	Workshop Critique and Discussions Dr. Pollock
5:00 p.m.	Adjournment
8:00 p.m.	Watermelon Party JCTI Campus

THURSDAY, JULY 17

Mr. John McClinton
Presiding Officer

8:00 a.m.	Institute Office Opens
8:30 a.m.	"DESIGNING AND IMPLEMENTING PRETECHNICAL PROGRAMS" Mr. Vernon Burgener Coordinator of Research State of Illinois Research Coordinating Unit Board of Vocational Education and Rehabilitation Springfield, Illinois
10:00 a.m.	Coffee Break
10:30 a.m.	Response and Discussions Mr. McClinton Mr. Burgener
12:00 noon	Lunch
1:30 p.m.	Workshop Groups
3:00 p.m.	Coffee Break
3:30 p.m.	Workshop Critique and Discussions Mr. Burgener
5:00 p.m.	Adjournment
7:00 p.m.	Dutch Treat Cocktail Party - Alico Inn
8:00 p.m.	Dinner - Alico Inn Speaker - Mr. Wick Fowler, Austin, Texas

FRIDAY, JULY 18

Mr. Bob Gentry
Presiding Officer

8:00 a.m.	Institute Office Opens
8:30 a.m.	"PRETECHNICAL CURRICULUM CONTENT AND INSTRUCTIONAL MATERIALS" Dr. Clodus R. Smith Director of Summer School University of Maryland College Park, Maryland
10:00 a.m.	Coffee Break
10:30 a.m.	Response and Discussions Mr. Gentry Dr. Smith
12:00 noon	Lunch
1:30 p.m.	Workshop Groups
3:00 p.m.	Coffee Break
3:30 p.m.	Workshop Critique and Discussions Dr. Smith
5:00 p.m.	Final Adjournment

WORKSHOP OBJECTIVES

Overall Objectives: The workshop group is to provide the participants with the opportunity to develop cooperatively, a written plan detailing the concepts, contents, benefits, and procedures for a proposed student development (remedial) programs. A portion of the complete plan shall be developed and written during each session.

Daily Objectives

Monday: Develop, by group discussion, and write collectively, an outline to serve as the guide for achieving the "overall objective".

Develop, by group discussion, and write an introduction for the total plan. The introduction should include such topics as need, benefits, and implication of such student development programs.

Provide the consultant one legible, written copy of group's work at the end of the workshop period.

Tuesday: No workshop.

Wednesday: Develop, by group discussion, and write collectively, that portion of the total plan pertaining to testing, counselling, and guidance services.

Provide the consultant one legible, written copy of group work at the end of the workshop period.

Thursday: Develop, by group discussion, and write collectively, that portion of the total plan pertaining to designing and implementing student development programs.

Provide the consultant one legible, written copy of group work at the end of the workshop period.

Friday: Develop, by group discussion, and write collectively, that portion of the total plan pertaining to curriculum content and instructional materials.

Provide the consultant one legible, written copy of group work at the end of the workshop period.

WORKSHOP GROUP LEADERS

Group I	Howard Nelson
Group II	Zack Belcher
Group III	Don Loftin
Group IV	Jim Lilly
Group V	Bill Rueter
Group VI	Ken Willis

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